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## Stop Being Sedentary

### **Introduction**

The chair is one of, if not the most, life-like designed objects. Think about the words we use to describe a chair: Legs, Back, Arms, Feet, etc. In our minds, a chair is a creature; it's a steed that we mount because we're too lazy to stand, and this is where the problem begins. People in Western, post-industrial societies sit too much, which has medical, political, and cultural consequences. I first attempted to remedy this by making a chair that discourages sitting, then a chair to satirize sitting to the point of disgust, before creating a chair that kept the sitter active, in motion, and using his or her own muscles for support. Of course, such a structure exists: the yoga ball. However, the yoga ball is formally not a chair and does not fit into most contexts in which chairs are culturally necessary. The project is then about creating a yoga ball-like structure that shares the form of a chair without losing its ability to keep the user moving.

### **Trajectory**

My project began with an attempt to synthesize two of my interests: sound sculpture and furniture design. I began by designing a very comfortable chair incorporating a sound system, which, unfortunately, is already a rather ubiquitous feature in modern furniture. I then considered a piece of furniture that could talk to the user: a chatbot program that could act like a therapist. I began learning to code in Python and making a layout for sensors, inputs, and outputs. The entire notion of making a comfortable seat that could make the user healthier fell flat when I questioned the health of sitting (and by extension excessive comfort). This is when the project became about building a device to keep the user from sitting. I started researching robotic components that could physically touch, poke, and move a human body. A chair that sensed the pressure of

someone sitting down could, for example, poke the sitter and express different emotions simply by changing the timing of the poke (a quick, fast poke as surprise; a slow, deliberate poke as rage). But this idea presented a dilemma: I wanted the poking chair to make the sitter reflect on his or her own actions and use of the chair. What prevents the sitter from just getting annoyed and moving to a different chair? This meant that I had to find a different method of coaxing the user into the behavior I wanted.



Figure 1: A mock-up consisting of sub-woofers, an amplifier, and a chair. The vibrations are maddening and make the leg muscles floppy.



Figure 2: Mock-ups utilizing collapse and gravity to prevent sitting or engage leg muscles.

I built mock-ups (Figures 1 and 2) that discouraged sitting with vibrations, loud noises, collapsing mechanisms, and ultimately found the best result in a goo-like material known in all kindergarden classrooms as Oobleck (named for the Dr. Seuss book “Bartholomew and the Oobleck”). A non-newtonian fluid, Oobleck becomes solid under sudden pressure and liquid once released from pressure. When sat upon, it slowly creeps up around the buttocks and attempts to devour the sitter, which is a great metaphor for sitting too long; consider its oozing state, spreading to the floor and puddling, whispering “if you sit too long you will become like meeeee.” However, the problem with Oobleck is that it separates without agitation. I then spent considerable time trying to perfect the substance and keep its consistency consistent. I tried cooking the material, adding emulsifiers (which did not work because emulsifiers suspend oil in

water, not particles), and mixed up batches of other non-newtonian fluids. The best result I achieved came with mixing aspects of Flubber (white glue, water, and borax) with the Oobleck. Mixed in the right order, with the right proportions, the cornstarch becomes suspended in the resulting polymer (Figure 3), which has stayed the same for months on end when sealed in an air-tight container.



Figure 3: The non-newtonian fluid I developed consisting of white glue, cornstarch, water, and borax. It can crumble like feta cheese, but oozes to the ground when there is no pressure.



Figure 4: A prototype trough seat filled with goo. The sitter displaces the goo until they reach the bottom of the trough in a couple of minutes, all the while experiencing a disturbing sinking feeling.

Trying to stick with the seating theme (Figure 4), I put the material into a variety of boxes and bags made of plastics, rubbers, and the like, only to find that it lost its material qualities once it was completely contained. During the months that I spent mixing and experimenting with this material, students in nearby studios flocked over to play with the material, finding it therapeutic and fun (they often asked to use it as a break from their own work). Why contain the material then, if it is fun and childish when uncontained? Because it must be contained in some way in order to be considered and discussed by the adult public (so you made goo, so what?). Or does it? I began to develop the idea of a one-time performance utilizing the material and performers dressed in business suits. The reasoning being that:

1. The western perception of adulthood is an office job.

2. People in office jobs sit for long periods of time.
3. People that sit for long periods of time are at risk for a variety of health issues.
4. QED Adult life = death. Stay child-like as long as you can!

However, I loathe performance art and strained to find another path to take. I was right back where I started, wanting to make a chair. After all I had learned about seating, I resolved to make a chair that would say “if you really must sit, this is how you should do it.” It would act as a yoga ball but be culturally appropriate for offices and restaurants. I experimented with a variety of radii (Figure 5) for a round-bottomed chair and found one that kept the user moving but did not throw him or her off too easily. I then digitally 3D modeled two stools whose tops and bottoms were routed out of laminated oak plywood (Figure 6). I filed and sanded these parts by hand and then cut the supporting structure on the band saw.



Figure 5: Testing a variety of radii for the bottom of the active-seating stool (or rocking stool). I found that, for someone of my height, a 25” radius caused too much rocking and motion sickness, whereas 27.5” did not provide enough motion. The compromise, 26.25”, worked very well.

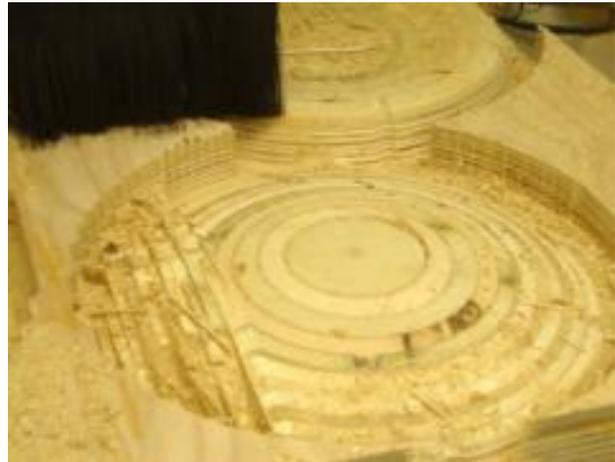


Figure 6: The tops and bottoms of the adult and child-sized stools were CNC routed out of laminated oak plywood.

I left a spherical space underneath the seats of the stools for wooden spheres that would rock around and knock against the stools when sat on. This adds another dimension to the use of the chairs, with the knocking of wood on wood, and mass beneath the seat fighting slightly

against the rocking of the user. I originally intended to rout these pieces, but the machinery failed to do so. I instead lathed the spheres by hand out of solid oak (Figure 7), only to find that the spheres did not work well, knocking loudly against the insides of the stools, if moving at all (Figure 8). I decided to leave that portion of the project out for further development down the line.



Figure 7: I got a chance to learn how to hand lathe in the last week of the project.



Figure 8: The intended space for the wooden sphere, but it was not meant to be.



Figure 9: The gallery set up with fellow student and friend Nina Pagalos providing human scale.



Figure 10: The gallery set up without people.

The stools, one for adults titled “Wobble”, one for children called “Widdle Wobble”, were presented in the Slusser gallery space on the concrete floor for all to sit on and use, with photos of the process taped to the gallery wall (Figures 9 and 10). I was surprised how many gallery visitors sat upon the stools and thoroughly enjoyed the experience, rocking back and forth,

spinning around, and gazing at the photos in wonder.



Figure 11: I took the small stool to Mitchell Elementary school where I am the program assistant for the Michigan Makers after school program.



Figure 12: The kids absolutely loved it, and teachers present commented on how such structures were greatly needed in their classrooms for fidgety children.

## Research

When we sit, we are in effect resting, not engaging our muscles, and not burning the calories we have consumed. Being perpetually at rest is damaging. Three weeks of bed rest in otherwise healthy men physically weakens them more than three decades of aging; 6 hours a day of sitting as opposed to 3 hours a day causes on average a 30% increase in mortality rate (Vlahos). What's killing these people? It's not actually the chairs; it's the use of the chairs. The average American sits 13 hours a day and sleeps 8 hours a day. That's 21 hours of inactivity. This inactivity leads to cardiovascular disease, type 2 diabetes, metabolic syndrome risk factors, and obesity (Hamilton). The main issues that cause these problems are a lack of energy expenditure and muscle atrophy that come with not tensing muscles.

When I studied furniture design in Copenhagen, my professors told me time and again that comfort was not an aspect of “Danish design.” Indeed, comfort is difficult to quantify, differs from person to person, and “people should not be sitting for very long,” my professors opined. I learned that Danish furniture is supposed to be functional (meaning only that it *can* be sat upon

but doesn't necessarily *need* to be) and that the way a piece looks is often most important. When I asked Hee Welling, a Danish designer, if he felt at all guilty for the proliferation of his self-acclaimed uncomfortable metal chair (Figure 13), he replied that he was proud and liked to see his pieces everywhere. Designing and constructing my own piece (Figure 14) made me understand that chairs are functional art objects: they can be used, but they don't have to be. Their sculptural qualities make them things that can be admired from afar.



Figure 13: Hee Welling's "Hee Dining Chair." It adds to the feng shui of the room without detracting from the architecture, but is very uncomfortable.



Figure 14: The chair that I made abroad, "Fårstol," literally "sheepchair" in Danish. My professors told me that it was very scandinavian; I made sure that it was comfortable nonetheless.

We depend on chairs but we don't really need them. The chair is introduced to us at a very early stage in life. As we grow, we are told to stay seated, to not move, and to pay attention. In his 1987 publication *Sparta/Sybaris*, Bernard Rudofsky, an Austrian-born American writer, architect, collector, teacher, designer, and social historian points out the conditioning we go through: the high chair, the school desk, the college lecture seat, the office desk chair, the sofa, the rocking chair, and the commemorative bench: thus is the life cycle of westernized post-industrial man. Because chairs (and the intensive use of them) become ingrained in our minds from such a young age, we depend on them and take them for granted as essentials. This means we also take life sitting down and have a harder time standing up for our rights. Consider how

we are taught to stay still and obedient throughout school and work. Our upbringing sedates us and makes us more malleable.

E.M. Forster takes this dependence on chairs to its logical extreme in his 1909 story *The Machine Stops*, considered the first ever dystopian tale. The story depicts a world in which humanity is reduced to weak blobs entirely entertained and dependent on a god-like automatic infrastructure called The Machine. People sit in their rooms all day, watching their screens, listening to music, and video-calling people (sound familiar?). When they want to go somewhere, they take the train that is right outside of their door, or an airship for long-distance travel. The protagonist, Kuno, realizes this dependence all around him and begins exercising: walking instead of taking the convenient transportation, climbing instead of taking elevators, etc.

Forster's vision is not the way things have to be. There are plenty of modern cultures that make do with less seating infrastructure than we do; in Japan it is traditional to eat kneeling at a low table; in Senegal and many other West African countries diners sit around a mat on the floor (though the elderly get benches). Many societies sit on the ground, and for some bizarre reason, we see this as barbaric. Included in *Sparta/Sybaris* is a page from a 1957 Scientific American magazine depicting the “anthropology of posture” and credited to Gordon W. Hewes. This page is a collection of human figures sitting and crouching on the ground in a variety of positions, each position numbered to show how many ways there are to support one's own weight without furniture. The particular page included reaches 120—that's 120 ways that you too, dear reader, can sit on the ground. And yet, the colonial mindset of Western Europe that spawned the US and saw all non-white peoples as inferior labeled their behaviors inferior as well. This is unfortunate, for being able to support one's weight without the need for a chair is truly an act of independence. Considering the lack of cushioning solid ground gives, one must shift positions to avoid cramps, allow blood flow, and stay comfortable. And as we have learned, the more

movement, the healthier the individual.

### Context

Through the course of this project, there were times at which others' work provided inspiration and points of reference. In the beginning, when the aim was comfortable, well-crafted furniture, I was drawing on my interaction with Danish furniture by designers like Hans Wegner (Figure 11) and Finn Juhl (Figure 12).



Figure 15: Hans Wegner's "Papa Bear Chair", 1951.



Figure 16: Finn Juhl's "Chieftain Chair", 1949.

However, as my attention turned to discomfort and getting people to stop sitting, I started searching for more modern, avant-garde work. For example, Tobi Schniedler's LonelyBench (from his LonelyHome series) has robotic, segmented cushions (Figure 13). Once the seat senses pressure, it raises its cushions in protest against its "(ab)use", as Schniedler puts it (Qtd. On M.A.O. Works website, no longer extant). I thought up similar creations that might vocally protest, and then began working with robotic movements.



Figure 17: Tobi Schniedler's LonelyBench.



Figure 18: Screenshot from a Little Caesar's pizza commercial in which two couch potatoes are swallowed by their bean bags.

When the project moved on to incorporating the non-newtonian fluid as a means of swallowing the seated individual, a series of videos were passed on to me. One was a commercial for a pizza company (Figure 14) in which two men sitting on separate beanbag chairs are slowly sucked into the chairs until they disappear. This was, essentially, what I was hoping to accomplish. However, the goo material could not be kept in an up-right shape (as it is a fluid and therefore finds the simplest way to reach the ground). This meant that the material could not be contained in a bag-structure successfully, stay upright, and keep its material qualities at the same time. This also meant that the chair, if indeed it was a chair, would need to be comprised of a rigid structure, allowing the material to stay upright but also allowing for bodies to sink into it.

People swallowed by goo chairs satirized the problem of too much sitting, but the next stage of the project was more proactive in instigating lifestyle change. An inspiration here comes from Victor Papanek's book *Design for the Real World*, where he shows a structure designed by Steven Lynch (Figure 15) that “provides eight more positions for restless children” in school (Papanek 64). Here the idea is to allow children that would otherwise be rendered incapable of paying attention because of high energy a way to expend the energy, stretch, and still participate in class. This product is for the minority of children who *cannot* stand still. What if it was the

norm and taught children they *shouldn't* stand still for the six hours of school? What if the structure morphed over time, forcing the children to move in order to stay on it, a sort of slow-motion self-directed exercise routine?

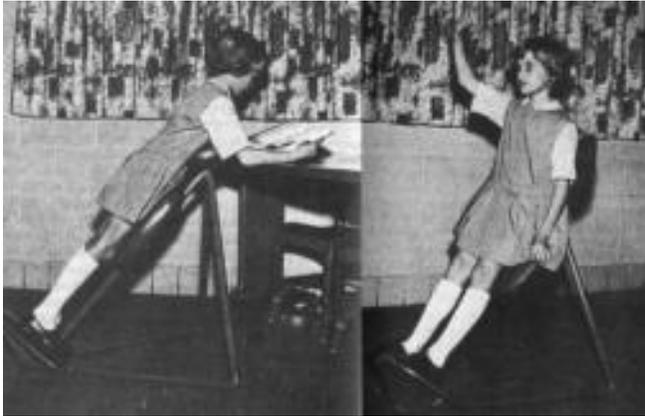


Figure 19: 8 position structure by Steven Lynch, pictured in *Design for the Real World*.



Figure 20: Active Furniture by Ferran Lajara. Pictures from Designboom.

Ferran Lajara expresses a similar sensibility to that of Steven Lynch. His *Active Furniture* collection (Figure 16) is comprised of pieces that make doing everyday things inconvenient but healthier. The lamp cannot stand on its own and must be held in place; the coat rack is a climbing wall that must be scaled to reach the coats. However, unlike Lynch's design, this oversteps the bounds of fun in favor of activity; it makes the user active, but also peeved. How long before the lamp is left on the floor, or the coats draped over a chair? Why would someone want to use such furniture if they are tired? In this way, a structure needs to be developed that keeps the user moving their own body in a way that is fun and engaging so that its use does not seem like a chore.

The yoga ball comes close to serving this purpose. This ball is often used as a desk chair in internet start-ups to keep the hard workers moving while sedentary (Figure 17). It is inflatable, cheap, and easy to store; it is incredibly functional, fun, easy to use, and simple. However, it is not a chair. Linking back to the Danish furniture ideals, it is rather unsightly and extremely

inelegant, making it a poor excuse for an art-object. My prototype stools, Wobble and Widdle Wobble, may not be as functional as the yoga ball, but they look and feel more like furniture (Figure 18).



Figure 21: A yoga ball in an office setting looks out of place. It does not look formally like a chair.



Figure 22: While the stools share functional properties of the yoga ball, they are structurally and formally more like contemporary chairs.

## Conclusion

The pieces I placed in the gallery show were not meticulously finished for they were meant to be functional prototypes. I learned quickly that the material I used was of insufficient quality (and required lots of patching of holes and cracks), and that some of my design decisions should have been better informed. Looking forward, I intend to experiment more with this idea and develop more prototypes examining different methods, materials, and uses. For instance, what happens when the stools are super light and can be carried on a finger? What if they are carved out of stone? Is there a simple solution to make them pack flat and easier to manufacture and ship? Such inquiry and experimentation will hopefully lead to solutions that will improve our sedentary lifestyles. I intend to continue this project in parallel with several other furniture projects directly out of college. After all, this project deepened my love and understanding of furniture and has got me absolutely chomping at the bit to begin making more things.

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