



# Changing Table

## **Team Members**

Michael Kapitz- Leader

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Mitch Tyler- Advisor

## **Clients**

Nathan Patterson

John Patterson

# Overview

- Problem Statement
- Background
- Motivation
- Design Specifications
- Design Alternatives
- Design Matrices
- Final Design
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# Problem Statement

- Marc Patterson is a 7 year old boy from Oregon, WI
- Suffers from Cerebral Palsy, Cortical Blindness, and Epilepsy
- Dependant on parents
- Needs to be changed
- Too big to be lifted to current table
- Goal: design adjustable height table

# Background

## Cerebral Palsy

- Neurological disorder that affects brain and nervous system functions
- Impairs:
  - Movement
  - Hearing
  - Vision
  - Thinking/Learning

# Cerebral Palsy

- Causes

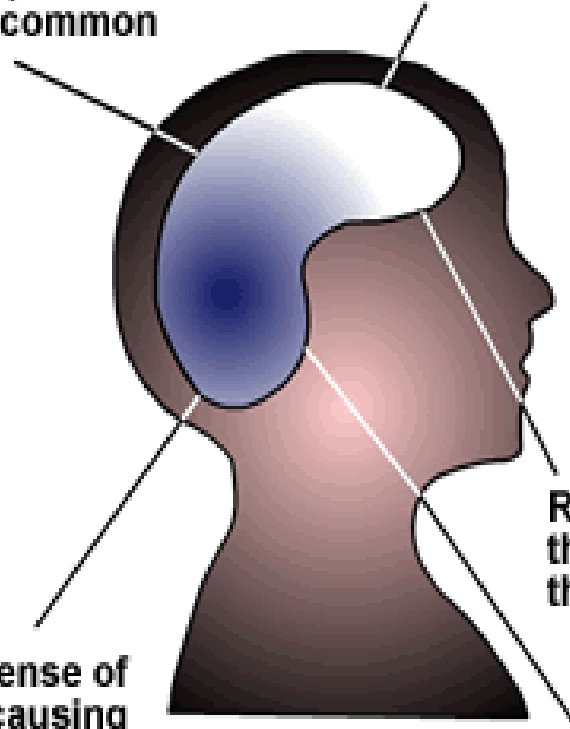
- Bleeding in the brain
- Head trauma
- Brain infections
- Infections in the mother during pregnancy

# TYPES OF CEREBRAL PALSY

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**SPASTIC-** tense, contracted muscles (most common type of CP).

**ATHETOID-** constant, uncontrolled motion of limbs, head, and eyes.



**ATAXIC-** poor sense of balance, often causing falls and stumbles

**RIGIDITY-** tight muscles that resist effort to make them move.

**TREMOR-** uncontrollable shaking, interfering with coordination.

# Motivation

- \$\$\$
- Aesthetically pleasing table
- Need and market



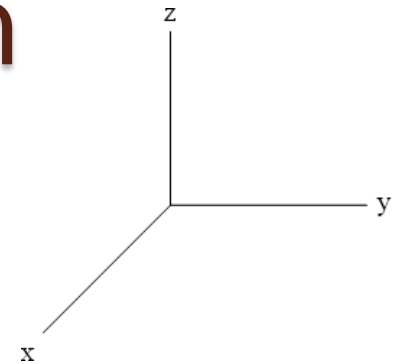
**Height Adjustment Changing Table with  
Optional Safety Rail**

**Price: \$2,861+**

<http://www.max-ability.com/preschgtab.htm>

# Design Specification

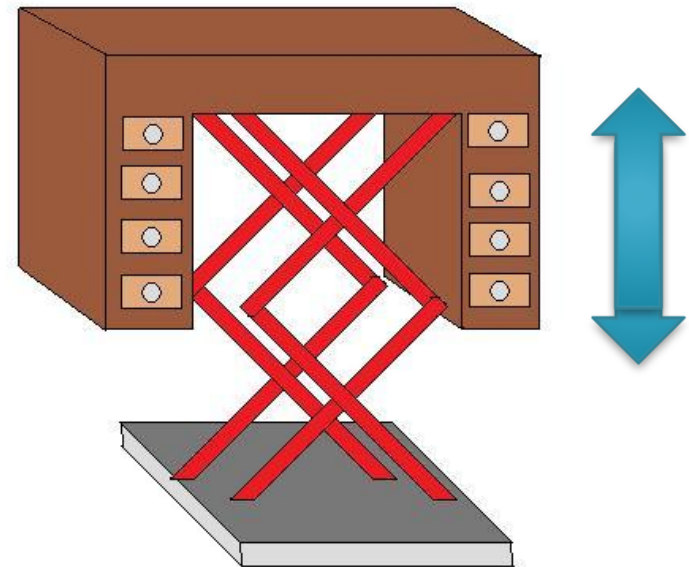
- Client Requirements
  - Safe to use
  - Aesthetically pleasing
  - Sturdy
    - Able to support a dynamic mass in the  $X$ - $Y$  plane
  - User friendly
    - Easy to raise and lower the table
    - Easy to maintain
    - Marc can easily lay down on top of the table with room to spare
  - \$300-\$400





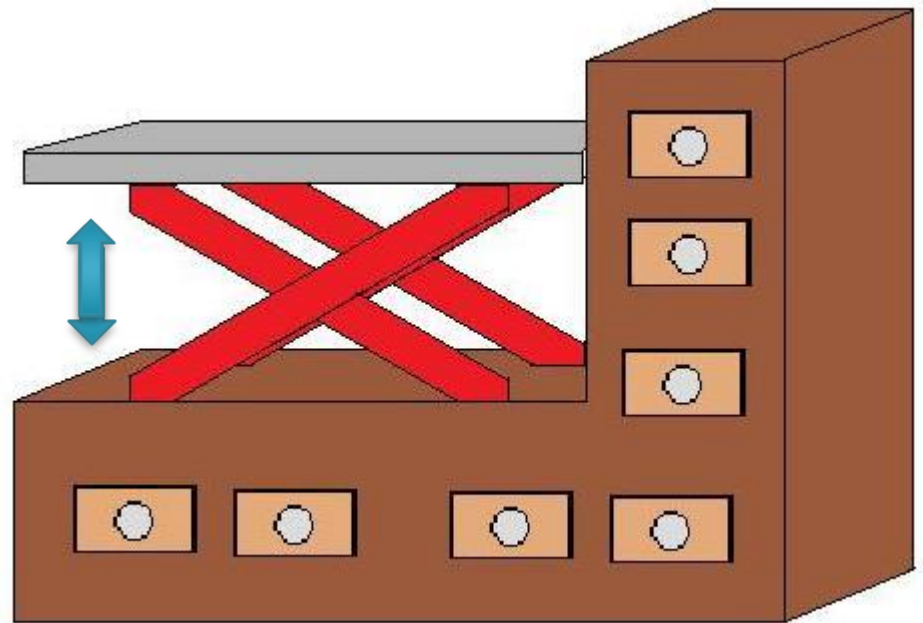
# Design Alternative-“Whole” Table

- Raise the whole table unit in the air
- Rest on ground when lowered
- Would hide the lift the most
- Problems
  - Strength of Lift
  - Safety



# Design Alternative-“L” Shape

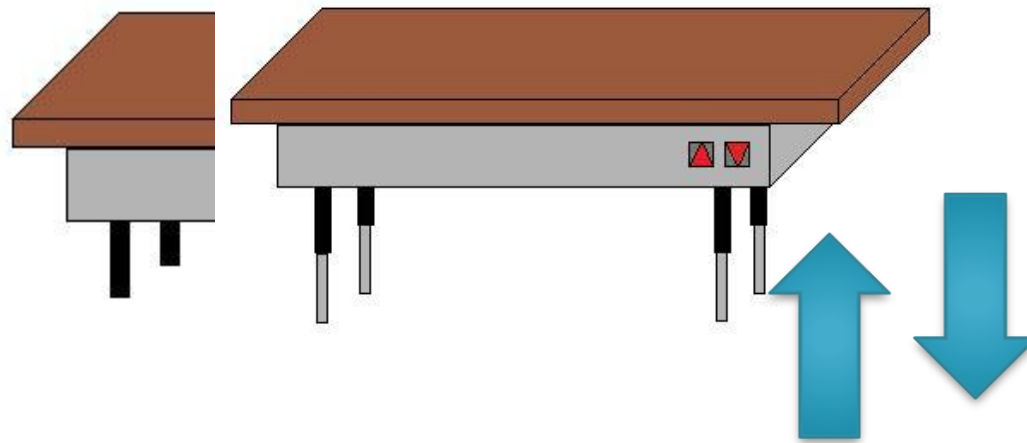
- Person would be only thing lift raises
- Maximizes storage space
- Tracks on side would stabilize platform
- Problems
  - Lift exposed



# Design Alternative-“Legs” Design

- Would look as a normal coffee table
- Each leg would extend upwards to raise table
- Problems
  - One leg fails
  - Cost
  - Storage space

# Picture



# Design Matrices

Category	"L" Shape	"Whole" Table	"Legs" Design
Safety (30)	20	10	25
Cost (20)	15	15	5
Aesthetics (20)	15	15	15
Maintenance (15)	7	6	13
Ease of Use (15)	15	15	15
Storage Space (15)	15	10	5
Cleaning (5)	3	3	5
Total (120)	90	74	83

# Final Design

- “L” Shape
- Includes:
  - Foot pump for lift
  - Storage space
- Northern Tool + Equipment
  - Fits design constraints



# Future Work

- Research legality of restraining straps
- Research materials for:
  - Lift skirt
  - Restraining straps
- Fabricate prototype
- Test final design

# Thanks to:

- Mitch Tyler
- Nathan Patterson
- John Patterson



# References

- [1] <http://www.cerebralpalsy.org/what-is-cerebral-palsy/>
- [2] <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001734/>
- [3] <http://www.neurologychannel.com/cerebralpalsy/symptoms.shtml>
- [4] [http://www.northerntool.com/shop/tools/product\\_200365531\\_200365531](http://www.northerntool.com/shop/tools/product_200365531_200365531)