CHAPTER 6
CASE WESTERN RESERVE UNIVERSITY

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CHAIR LIFT

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INTRODUCTION

The Chair Lift is a mechanism designed to open and lift a reclining chair so that people who cannot lower or lift themselves from most chairs can get easily in and out of a modified chair. The woman for whom this chair was modified has fused vertebrae in her lower back and cannot bend enough to lower herself into a chair.

SUMMARY OF IMPACT

Without this device, the client essentially dropped herself into chairs and relied on others to get her out of chairs. By having a chair that can raise and lower her, she is now able to safely get in and out of a chair without assistance.

TECHNICAL DESCRIPTION

The Chair Lift consists of a pair of four-bar mechanisms that are driven by a lead screw actuator. The four-bar mechanism is used to both open the reclining chair and to lift the chair from the ground. The four-bar mechanisms are made from low carbon steel square tubing. The actuator couples the four-bar mechanisms to the base frame, which is also made from low carbon, square steel tubing. The revolute joints and the connections between the actuator, the mechanisms and the frame are made with stainless steel pins. The revolute joints also incorporate bronze bushings. The actuator is controlled via a pendant, which can be attached to the arm of the chair, and also by a pair of limit switches that govern the total range of the mechanism motion.

Project cost:

Reclining Chair	$225.00
Lead Screw Actuator	$185.00
Metal Stock	$ 55.00
Misc. (bushings, fasteners, etc.)	$ 20.00
Total:	$485.00

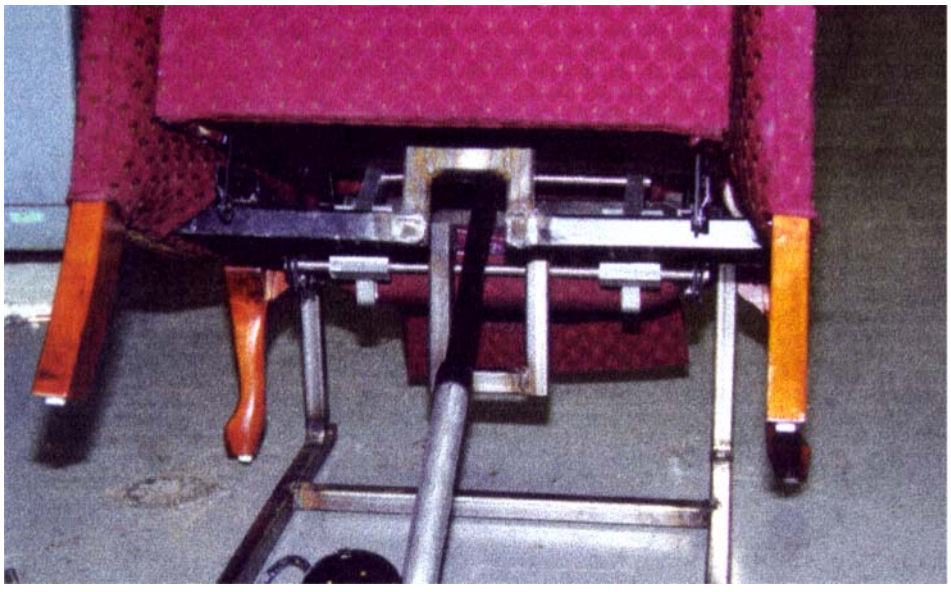

Figure 6.1. Chair Lift.

HAND POSITION TOY

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INTRODUCTION

The Hand Position Toy is a tool designed to help children with limited fine motor skills learn to manipulate and handle objects. The toy incorporates several different tasks for children to perform, such as moving beads, spinning a wheel and pushing a button. The toy also rewards the children for successfully completing a given task by producing a stimulus. The toy can also be used to reward the student for holding the device in a desired orientation. Different rewards, such as sound or light, can be selected for each of these tasks.

SUMMARY OF IMPACT

This device makes it much easier to teach small children to maintain a specific hand orientation, to recognize patterns, and respond to stimuli. The lights and noises make it an attractive and fun tool for children.

TECHNICAL DESCRIPTION

The toy consists of a plastic food storage container covered with padding and fabric cover. Batteries and switches are mounted within the container, as are the stimulus producers: colored lights, a small fan and an electric bell. The switches are set up so that, depending upon which task has been performed, different stimuli are triggered. Rearranging appropriate jumpers can alter the task/stimuli relationship (i.e. which bell or light goes with which task). Spatial orientations, which can be used to reward the child for proper hand position, are limited to holding the toy in any of the orthogonal planes, which make up the sides of the toy (for instance, holding the toy upright or 90° on one of its sides). A rotating, transparent cylinder containing colored shapes, a strand of colored beads of various shapes, and a doorbell button are mounted to the top of the toy allowing a therapist to specify different tasks such as "find the two blue beads" or "push the button".

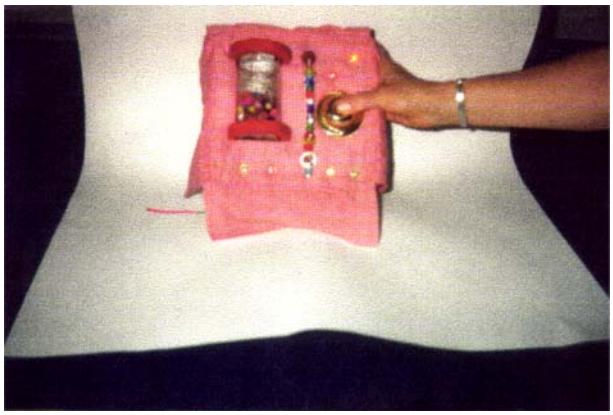

Figure 6.2. Hand Position Toy.

Project Cost:

Plastic container	$ 5.00
Stimulus devices (fans, lights, etc.)	$25.00
Miscellaneous (beads, fabric, etc.)	$10.00
Total:	$40.00

CHEMICAL SENSITIVITY BOOTH

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INTRODUCTION

The Chemical Sensitivity Booth was designed and built to allow persons with multiple chemical sensitivity (MCS) to attend theatrical and musical productions in public. Persons who have MCS can have violent allergic reactions to many everyday substances, such as carpet fibers, perfumes or varnish. The wide variety of allergens makes it nearly impossible for people with MCS to function in public settings.

SUMMARY OF IMPACT

This booth isolates those with MCS from the influence of allergens and allows for attendance of public events such as watching a play or a ballet. While the booth can be used in many other places, this booth was designed specifically to fit within footprints available for persons with disabilities at the one particular theater.

TECHNICAL DESCRIPTION

The booth was constructed using materials and coatings that are safe for people with MCS. Specifically, the booth's frame is constructed from pine that has been stained and sealed using special resins that do not outgas after curing. The window panels are constructed from Plexiglas, which also does not outgas. The booth is not sealed. Instead, filtered air is pumped in so that the air pressure within the booth is greater than the ambient air pressure and hence contaminants cannot enter the booth. The air is filtered using a HEPA air filter that is kept within a box lined with anechoic foam padding. This prevents the noise of the filter from interfering with other spectators. The booth is also designed to be lightweight and easy to assemble and disassemble so that it can be quickly set up and torn down between shows and for different theaters. Additionally, the booth is designed to accommodate a person in a wheelchair; a ramp is attached to the entrance of the booth and the width and depth of the booth is great enough to accommodate a wheel chair. An adjustable mount for a microwave pickup is mounted onto the roof of the booth so that the theaters' existing sound transmission system can be used to provide sound within the booth via headphones. This allows the person within the booth to hear the presentation without the muffling inherent in listening through the walls of the booth.

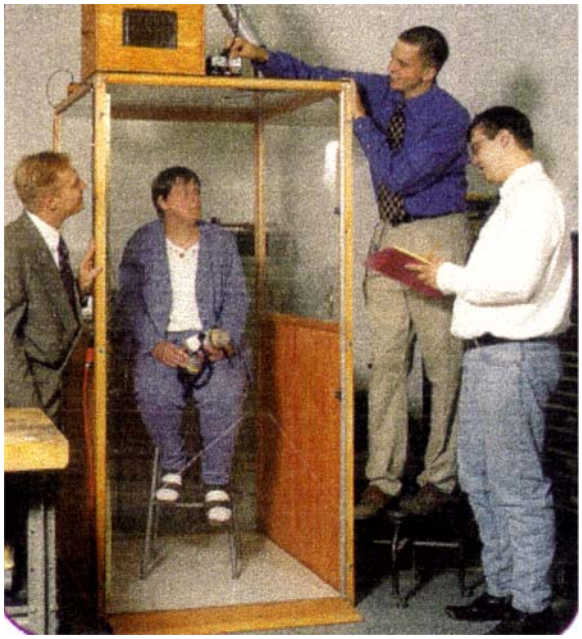

Figure 6.3. Chemical Sensitivity Booth.

Project Cost: Home Depot donated the lumber used for this project (approximately $40 worth). The remaining materials costs were:

3 sheets of Plexiglas	$210.00
HEPA Filter	$165.00
Microwave pickup mount	$ 35.00
Stain/sealant	$ 22.00
Misc. (hinges, fasteners, etc.)	$ 20.00
Total:	$452.00