



## Canadians in Space / Les Canadiens dans l'espace [space.yesican-science.ca](http://space.yesican-science.ca)

### Catch It If You Can

#### Background

Normal activity on Earth such as walking, standing, sitting, and working with the hands requires the brain to interpret and integrate information from all the body's senses (touch, hearing, sight, etc.). Once the brain processes this information, it gives feedback to the body on how limbs are positioned, how the entire body is oriented (up or down, right or left), and which muscles should be moved to re-orient the body.

In the free-fall environment of space, the inner ears, muscles, joints, and skin cannot rely on gravity as a constant indicator of position and orientation. In order to produce correct responses, the brain must rearrange the relationships among the signals from these sensory systems when it processes the information. This rearrangement requires a period of adaptation. Before the body adapts, astronauts can get the illusion that their body or their environment is moving when both are stationary. When they return to Earth they may experience these problems again, since their body must readjust to the sensation of gravity. The length of recovery time is related to the duration of the mission.

#### Class Discussion

- Ask students to describe their experiences on roller coasters and/or their experiences on "virtual roller coasters."
- When you are in free fall things appear to have no weight because they are falling at the same rate as you are.

This activity helps students understand the adaptations that astronauts must undergo in their microgravity environment.

#### Catch the Ball Experiment

##### Purpose:

To show that we normally track and receive things in a polar environment (distinct north-south direction).

**Materials:**

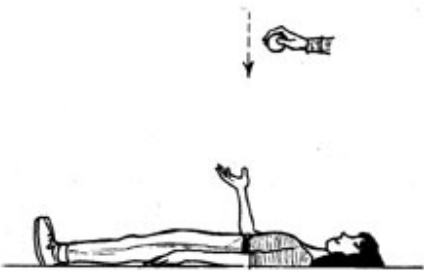
- Tennis ball
- Ask the students to work in partners.

**Procedure****Trial # 1**

The subject sits on the floor facing forward.  
The partner drops a tennis ball from 2 metres directly above the subject's head.  
The subject tries to catch the ball in one hand.

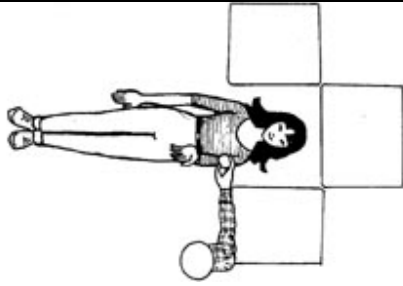
**Trial # 2**

Repeat the procedure with the subject lying on his/her back.

**Trial # 3**

The subject remains lying down. Place three desks on their sides to frame the subject's head.

Repeat the procedure.



Ask the students to describe what happened in each trial.

### **For Discussion**

Ask the following questions:

1. Did the subject's reaction time and dexterity change while lying down?
2. Why do you think this happened?
3. What effect did the desks have on the subject's reaction time and dexterity?
4. Ask students to relate these results to the difficulties astronauts have performing daily tasks in the Spacelab.
5. How might these findings apply to astronauts adapting to microgravity?
6. How might this apply to training our astronauts?