

MISSION X

TRAIN LIKE A PARASTRONAUT



Wheelchair fencing

In 2022, British surgeon John McFall, whose right leg was amputated after a serious motorbike accident, became the first disabled person to join ESA's new class of astronauts. He is now part of an unprecedented programme to study the "feasibility" of spaceflight access for "parastronauts". John McFall is also a former paraport world sprint champion over 100 and 200 metres, in 2007, before winning a bronze medal at the Beijing Paralympic Games the following year!

The 17th Paralympic Games took place from 28 August to 8 September 2024 in France. During these games, 23 different sporting disciplines were represented, including wheelchair fencing.

Why is fencing, an Olympic sport, and in particular wheelchair fencing, a Paralympic sport, good training for astronauts and parastronauts?

MISSION DESCRIPTION

When the rocket propelling them to the space station lifts off, the astronauts' bodies are subjected to an acceleration which is 3 or 4 times Earth's gravity. It's as if they weighed 3 or 4 times their own weight. Under these conditions, it is very difficult to move to control the ship. So, the astronauts use a baton to press the various keys on their ship's control panel.

In this activity, we're going to simulate a lift-off. Strapped into your seat, you won't be able to move, as if you were being crushed. Under these conditions, you'll need to be able to press the indicated buttons as quickly as possible to monitor your ship's control parameters correctly.

Just like in fencing, you'll need to manage your stress, be quick, precise and follow the instructions to activate the right button at the right time! The simulation of the effect of acceleration when the rocket takes off adds to the constraints and difficulties that can be found in this sport when you are disabled, particularly in a wheelchair.



Soyuz Capsule © Roscosmos, NASA



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SKILLS WORKED ON

- Developing motor skills and building a body language
- Acquiring methods and tools for learning, individually or in groups, through practical experience
- Abiding by the same rules, taking on roles and responsibilities to learn to live together
- Learning how to maintain health through regular physical activity
- Adopting a physical, sporting and artistic culture

MISSION PREPARATION

- Provide several chairs with straps to tie the pupils' legs and torsos (optional).
- Each child will have a stick about 30 cm long.
- Prepare a mock control panel with buttons of different colours and shapes.
- Create groups of 6/7 young people.

WARM-UP

The children first test the exercise without being tied down.

The person in charge of the mission will indicate the colour of the key to be pressed.

The children have to press the indicated button with their stick as quickly and accurately as possible. Repeat the exercise 5 or 6 times.

MISSION SEQUENCE

Contextualise the activity by imagining that the children are future astronauts on a training mission to learn how to pilot their spaceship!

The children in the first group are strapped into their chairs so that they can only move their arms and heads (optional). As with the warm-up, the team leader indicates the colour of the key to press with their sticks. The child who presses the correct key fastest scores a point. Other criteria for success may be included in the assessment, such as precision; concentration and calmness in the face of stress; helping each other if the activity is carried out as a team and one of the members is having difficulty; clarity of the commands given; etc. Each part can involve between 10 and 15 commands, for example. The child with the most points wins. Team assignments can also be planned.

NB: The instructions can also be signed for hearing-impaired children or used to teach simple words in French sign language (LSF). For visually impaired children, one can use various sounds in the immediate environment to convey instructions.

Point out to the children that their performance improves with practice and that they can then gradually increase the difficulty and/or intensity of the activity.

EXAMPLES OF POSSIBLE ADAPTATIONS

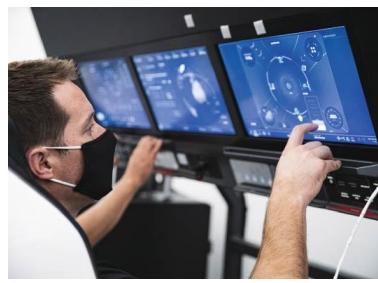
Increase the difficulty and/or intensity:

- Increase the distance from the control panel.
- Call out shapes instead of colours for the touch buttons.
- Give more commands each time and different indications (shape and colour [e.g. yellow triangle button]; a sequence of 2 or more commands to aim at [e.g. blue button then orange button]; different indications for each command in the same sequence of instructions [e.g. red button then square button]; add numbers to the commands; etc.).
- Adding external stress to the execution of commands, for example by giving a minimum execution time for completing a series of commands; adding a louder or softer sound; moving the chair and/or the control panel; asking people to answer questions at the same time; changing the commands being executed when a problem occurs; adding external visual stimuli; etc.

Reduce the difficulty and/or intensity:

- Reduce the distance from the control panel.
- Do not attach the pupils' torsos.
- Propose a simplified control panel (fewer buttons, larger buttons, same shapes or colours; non-geometric shapes such as animals/fruits or other shapes; etc.)
- Do not consider the speed of execution, only the correct execution of the order.
- Suggest pointing at the controls with large gloves instead of a stick, or just with their fingers.

DID YOU KNOW?



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For his first PROXIMA mission, French ESA astronaut Thomas Pesquet left in a Russian SOYUZ capsule (left) that can accommodate up to 3 cosmonauts, while for his second ALPHA mission, he boarded the American CREW DRAGON capsule (right) with 3 of his fellow astronauts: this meant new suits and a new control panel that he had to learn to use on a simulator (centre)!

Takeaway: The control panel is only used to display monitoring parameters. The astronauts do not pilot the spacecraft. Everything is managed by an automatic pilot!