

Problem-solving and composure while disorientated:

What effects does being spun around in a motorised chair have on mental abilities and the fight-or-flight response?

Scientific study title

The effects of passive rotary motions on mental spatial transformations and heart rate variability

Invitation to participate in the study

We would like to invite you to take part in our research study. Before you decide, we would like you to understand why the research is being done and what it would involve for you. The study has been fully approved by the University of Westminster. Please take your time to read the following information carefully and discuss it with friends, family and your GP if you wish. We would be happy to go through the information sheet with you and answer any questions you have. Ask us if there is anything that is not clear.

What is the purpose of the study?

We wish to find out what happens to our mental capabilities and our calmness when we become dizzy or disorientated. Turning or spinning around in certain ways can lead to feelings of dizziness or disorientation. This is because certain head rotations intensify the signals sent to the brain from the vestibular organs in our inner ears about our orientation and motion. These intense vestibular signals mismatch with visual signals sent to the brain about our orientation and motion. Mismatching visual and vestibular signals are thought to explain why pilots are prone to dizziness or disorientation during some flight manoeuvres, and why patients with inner ear disorders experience dizziness or disorientation during many day-to-day situations.

Research is lacking into how mismatching visual and vestibular signals, and resultant dizziness, influence our ability to problem-solve and to keep composed. This study is important because it may help us to understand human error by flight crew contending with dizziness or disorientation. It may also help us to appreciate the day-to-day difficulties experienced by patients with vestibular disorders.

Do I have to take part?

It is up to you to decide to get involved in the study. We would be happy to go through this information sheet with you and answer any questions you have. If you agree to take part, we will ask you to sign a Consent Form. You are free to withdraw at any time, without the need to give us a reason. This would not affect the service standards you would expect from the University of Westminster.

For more specific information about your rights as a participant in this study, please see the '*Summary of your rights and our assurances*' section below.

Why have I been asked to take part in the study?

We are inviting you to take part in the study because you are over 18 years of age, and in decent health, with no previous experiences of severe, unexplained dizziness. For more specific information about whether your health and wellbeing make you a suitable candidate to take part in this study, please complete the '*Eligibility Screening Questions*' below.

By studying 80 people's problem-solving abilities and composure while being spun around, we should gain enough information to identify gaps in the safety and wellbeing of professionals and patients with dizziness or disorientation.

Will I have to prepare anything before taking part?

If you volunteer to take part, the Lead Researcher will offer you a choice of days and times to attend an appointment with him at the University of Westminster. The study appointment will be held in the Health Psychology Laboratory, a quiet and secure room in the main University buildings (see full '*Laboratory Address*' below). Before you attend your appointment, you should:

- Complete the Eligibility Screening Questions – see below;
- Avoid consuming any alcoholic substances for 24 hours prior to the appointment;
- Avoid taking any types of medicinal or non-medicinal substances, which specifically affect your ability to drive or operate heavy machinery, for 24 hours prior to the appointment. PLEASE NOTE, do not stop any medications without consulting your GP first;
- Aim to have a good night's sleep just before the appointment;
- Avoid having a heavy meal at least two hours prior to the appointment;
- Notify the Lead Researcher before attending your appointment if you are unwell or recovering from illness or surgery on the day of the appointment.

What will I have to do during the study, and how long will it last?

When you arrive for your study appointment, you will be greeted by the Lead Researcher, who will give you a short presentation on the research to aid your understanding of it. He will double-check you have had no recent or past health problems preventing you from taking part in the study, and ask you to fill-in a consent form. You will then be requested to complete three questionnaires to gauge your tendencies for motion sickness and anxiety, and whether you are left- or right-handed.

You will be shown how to put on a wireless heart rate monitor, which will record your heart rate throughout the study so we can tell how composed you were during it. More specifically, the recordings will tell us how much of a fight-or-flight response your nervous system reacted with during the study. The fight-or-flight response tends to occur to varying extents when we encounter new or surprising situations. You will have the privacy of nearby toilet facilities in which to fit the light-weight monitor around your chest.

You will be seated throughout the remainder of the study, with a laptop computer resting on your lap. You will be given a problem-solving task to do on the laptop, which will involve judging whether certain features of on-screen images are left- or right-sided. The task will only last one minute, but you will be asked to do it twice for practice, then six times in a row for real. During those six times, you will be spun around (see '*How will I be spun around?*' below). In-between each task, you will be asked to rate your motion sickness, anxiety, stability and mental effort. You will also be given a break between each task, which is why the appointment in the Laboratory might last an hour even though you will only be doing the task for eight minutes in total.

We may also record your eye movements while you are doing the task. A small eye tracking device positioned just under the screen of the laptop will enable us to do this. You will not be aware that the device is turned on. It will only capture the movement of your pupils and not your other facial features or expressions. The recordings will allow us to analyse whether

your eye movements corresponded with your problem-solving abilities and your fight-or-flight response during the study.

How will I be spun around?

Throughout the study, you will be comfortably and securely seated in a motorised rotary chair (Figure 1). The chair was purpose-built by the Royal Air Force (RAF) to train fighter pilots to become more tolerant of dizziness and motion sickness during flight manoeuvres. For the past decade or more, the chair has been based at the University of Westminster, and used to study the consequences of mismatching visual and vestibular signals.



Figure 1: Rotary chair with cabin open



Figure 2: Rotary chair with cabin closed

During all six of the one-minute, non-practice tasks, the chair's fabric cabin will be sealed-up along its Velcro seams. Therefore, you will be enclosed inside the cabin (Figure 2). There will be two types of chair rotation:

1. During three of the tasks, you will be rotated at a consistent speed of 90 degrees per second (i.e. four seconds for one full rotation).
2. During the other three one-minute tasks, the chair will reach 90 degrees per second, but will then slow down to a stop.

If you would like to watch videos of these two types of chair rotation, please contact the Lead Researcher (see '*Further information and contact details*' below).

What are the possible disadvantages and risks of taking part?

You may feel dizzy or disorientated during one or both types of chair rotation. You will be given plenty of breaks, so the dizziness or disorientation should settle after each one-minute task. Neither the consistent chair rotation nor the decelerating chair rotation should trigger much nausea or sickness, according to the preliminary research we have conducted and previous studies conducted at other Universities. If you do experience moderate nausea or sickness, you should tell the Lead Researcher immediately. He will do his utmost to try to relieve the problem, and will not continue with the research until you feel better. In the

unlikely event that you experience dizziness, disorientation or sickness that persist for a day or more after your appointment, you should contact the Lead Researcher. He will be able to advise you about the best way in which your problem(s) can be addressed.

Will I have to do anything after taking part?

We recommend, if you take part in the study, you should avoid driving or operating heavy machinery for the remainder of the day. You will not need to do anything else after the study appointment has finished.

Will my taking part in the study be kept confidential?

Yes. We will follow all ethical and legal research practices. All information which is collected about you during the study will be kept strictly confidential, and any study information which leaves the University will have your name removed so that you cannot be recognised.

What will happen to the results of the study?

We intend to publish the results of the study in a scientific journal. You will not be identifiable from the data that is put forward for publication. If you wish, we will post you a broad summary of the results.

Who is organising and running the study?

The study has been organised, and will be carried out, by Mr Jeremy Corcoran, Doctoral Researcher and Clinical Specialist Physiotherapist. It will form part of his PhD project. He is being supervised by Professor Tony Towell, Professor John Golding and Dr Mark Gardner, who are all experienced researchers in this field.

Further information and contact details

If you would like further information about this study, please contact the Lead Researcher:

Mr Jeremy Corcoran
Doctoral Researcher
Department of Psychology
University of Westminster
Room 7.108 Clipstone Building
115 New Cavendish Street
London, W1W 6UW

Telephone: 020 3506 9076 / 07581 133 769
Email: j.corcoran@my.westminster.ac.uk

Laboratory Address

If you volunteer to take part, you will be asked to attend a study appointment at:

Health Psychology Laboratory
University of Westminster
Room 3.108 Clipstone Building
115 New Cavendish Street
London, W1W 6UW

Summary of your rights and our assurances

Please note:

- Your participation in this research is entirely voluntary.
- You have the right to withdraw at any time without giving a reason.
- Withdrawal from the research will not affect any treatment and/or services that you receive at the University of Westminster.
- You have the right to ask for your data to be withdrawn, as long as this is practical, and for personal information to be destroyed.
- You do not have to answer particular questions, either on questionnaires or in interviews, if you do not wish to do so.
- Your responses will be made anonymous, and will be kept confidential.
- No individuals should be identifiable from any collated data, written report, or any publications arising from the research.
- All computer data files will be encrypted and password protected. The researcher will keep files in a secure place and will comply with the requirements of the Data Protection Act.
- All hard copy documents, e.g. consent forms, completed questionnaires, etc. will be kept securely and in a locked cupboard on University premises. Documents may be scanned and stored electronically on the University's secure computer systems.
- If you wish, you can receive information on the results of the research. Please indicate on the consent form if you would like to receive this information.
- If you have a complaint about this study you can contact the project supervisor, Professor Tony Towell, by e-mail (A.Towell@westminster.ac.uk) or by telephone (0207 911 5000 x69019).

Eligibility Screening Questions

Before you take part in the study, we would like to check that you have had no recent or past health problems that might mean you are ineligible. Please read the following questions and answer by **ticking either the 'Yes' or 'No' box**.

	YES	NO
Do you have any problems with your eye movements, or with your peripheral or central vision, or any other major eye problems that are not corrected by glasses or contact lenses?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any problems with the feeling or sensation in your limbs, for example severe numbness or tingling in your arms or legs?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any movement or balance difficulties such that you cannot stand steadily for longer than 10 minutes and/or hold and manipulate an object such as a computer mouse?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had any visually-triggered fits, epileptic seizures or severe migraines?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had any spontaneous episodes of dizziness (including vertigo, unsteadiness, or collapses) lasting longer than 1 hour or recurring on 2 or more days?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any serious conditions of your heart, circulation or blood vessels, for example recent* syncope (blackouts), recent* heart surgery, vertebrobasilar insufficiency (narrowing of the arteries in your neck), or an irregular heart beat despite medication?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any serious disorders of your brain or nerves, for example a recent* stroke, uncontrolled epilepsy or migraine, cervical myelopathy (compression of your spinal cord in your neck), Alzheimer's disease or other neurodegenerative conditions?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any other potentially serious health conditions, for example cancer or 'thinned blood' due to medications or disease?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have any major mental health problems, for example severe depression or anxiety?	<input type="checkbox"/>	<input type="checkbox"/>
Are you pregnant, or is there a strong chance that you might be?	<input type="checkbox"/>	<input type="checkbox"/>

*Recent means the last 3 months

If you have answered 'No' to all of the above questions, and you would like to take part in the study, please contact the Lead Researcher, Jeremy Corcoran. Jeremy will be able to offer you a choice of days and times to attend an appointment with him at the University of Westminster.

If you have answered 'Yes' to any of the above questions, you may not be eligible to take part in the study. If you are keen to do so, please contact the Lead Researcher, Jeremy Corcoran, to discuss your health status and eligibility in more detail.