Application for Ethical Approval

Project Title: Acquisition and control of action sequences

Principal investigator: Kornysheva, Ekaterina

Pre-screen Questions

Type of Project
D.Clin.Psy. MSc/MRes. Other please state. PhD. Staff. Undergraduate Project

What is the broad area of research
Other please state
Further details: Motor sequence learning and control (finger movements, tool use, vocal production/speech, hand-writing, reaching)

Funding body
Internally Funded

Type of application (check all that apply)
A new application that does not require sponsorship or scrutiny from an outside body?

Proposed methodology (check all that apply)
Other type of research, please specify. Standard behavioural tasks such as computer-based reaction time, standardised tests, picture pointing, eye-tracking, etc.
Further details: EMG (surface electrodes)

Do you plan to include any of the following groups in your study?

Does your project require use of any of the following facilities and, if so, has the protocol been reviewed by the appropriate expert/safety panel? If yes please complete Part 2:B

If your research requires any of the following facilities MRI, TMS/ tCS, Neurology Panel, has the protocol been reviewed by the appropriate expert/safety panel?
Not applicable (the research does not require special safety panel approval)

Connection to Psychology, (i.e. why Psychology should sponsor the question)
Investigator is a staff member in Psychology (including the North Wales Clinical Psychology Programme)

Does the research involve NHS patients? (NB: If you are conducting research that requires NHS ethics approval make sure to consult the Psychology Guidelines as you may not need to complete all sections of the Psychology online application)
No

Has this proposal been reviewed by another Bangor University Ethics committee?
No

NHS checklist. Does your study involve any of the following?

Part 1: Ethical Considerations

Will you describe the main experimental procedures to participants in advance, so that they are informed about what to expect?
Yes

Will you tell participants that their participation is voluntary?
Yes

Will you obtain written consent for participation?
Yes

If the research is observational, will you ask participants for their consent to being observed?
N/A

Will you tell participants that they may withdraw from the research at any time and for any reason?
Yes

With questionnaires, will you give participants the option of omitting questions they do not want to answer?
Yes

Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?
Yes

Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?
Yes

Will your project involve deliberately misleading participants in any way?
No

Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort? If *Yes* , give details and state what you will tell them to do should they experience any problems (e.g., who they can contact for help)
Yes
Further details: There is a small risk of fatigue involved in motor sequence learning and serial reaction time experiments. Only custom-made response and recording devices will be used, such as a 5-button finger boxes (Curdes), ergonomically optimised bimanual force transducer keyboard (built in-house by the technical support team), motion capture with markers (e.g. Polhemus Liberty), a microphone headset for noise isolation and speech recordings (e.g. Sennheiser), or similar. The hand and limb position on the response devices and the placement of recording devices will be adjusted carefully for every subject to prevent any discomfort. A period of rest will be provided after each block of trials (typical block length

Is there any realistic risk of any participants experiencing discomfort or risk to health, subsequent illness or injury that might require medical or psychological treatment as a result of the procedures?
No

Does your project involve work with animals? If *Yes* please complete Part 2: B

No

Does your project involve payment to participants that differs from the normal rates? Is there significant concern that the level of payment you offer for this study will unduly influence participants to agree to procedures they may otherwise find unacceptable? If *Yes* please complete Part 2: B and explain in point 5 of the full protocol
No

If your study involves children under 18 years of age have you made adequate provision for child protection issues in your protocol?
No

If your study involves people with learning difficulties have you made adequate provision to manage distress?
N/A

If your study involves participants covered by the Mental Capacity Act (i.e. adults over 16 years of age who lack the mental capacity to make specific decisions for themselves) do you have appropriate consent procedures in place? NB Some research involving participants who lack capacity will require review by an NHS REC. If you are unsure about whether this applies to your study, please contact the Ethics Administrator in the first instance
N/A

If your study involves patients have you made adequate provision to manage distress?
N/A

Does your study involve people in custody?
No

If your study involves participants recruited from one of the Neurology Patient Panels or the Psychiatry Patient Panel then has the protocol been reviewed by the appropriate expert/safety panel?
N/A

If your study includes physically vulnerable adults have you ensured that there will be a person trained in CPR and seizure management at hand at all times during testing?
N/A

Is there significant potential risk to investigator(s) of allegations being made against the investigator(s). (e.g., through work with vulnerable populations or context of research)?
No

Is there significant potential risk to the institution in any way? (e.g., controversiality or potential for misuse of research findings.)
No

Part 3: Risk Assessment

Is there significant potential risk to participants of adverse effects?
No

Is there significant potential risk to participants of distress?
No

Is there significant potential risk to participants for persisting or subsequent illness or injury that might require medical or psychological treatment?
No

Is there significant potential risk to investigator(s) of violence or other harm to the investigator(s) (e.g., through work with particular populations or through context of research)?
No

Is there significant potential risk to other members of staff or students at the institution? (e.g., reception or other staff required to deal with violent or vulnerable populations.)
No

Does the research involve the investigator(s) working under any of the following conditions: alone; away from the School; after-hours; or on weekends?
Yes
Further details: Although most of the experimental work will be conducted during core working hours, some training and testing of participants may take place after-hours and over weekends. The experimenter will inform the PI (Dr. Kornysheva) of any experimental activity and if the latter overlaps with this period, the PI and the experimenter will make sure there is another lab member or colleague in the Lloyd building or Brigantia on call throughout the testing phase in case assistance is required.

Does the experimental procedure involve touching participants?
Yes
Further details: If limb kinematics are recorded, the experimenter will attach lightweight markers and/or surface EMG electrodes to the hands/arms/legs/face/head using tape, as stated in the Participant Information Form, attached.

Does the research involve disabled participants or children visiting the School?
No

Declaration

Declaration of ethical compliance: This research project will be carried out in accordance with the guidelines laid down by the British Psychological Society and the procedures determined by the School of Psychology at Bangor. I understand that I am responsible for the ethical conduct of the research. I confirm that I am aware of the requirements of the Data Protection Act and the University's Data Protection Policy, and that this research will comply with them.
Yes

Declaration of risk assessment The potential risks to the investigator(s) for this research project have been fully reviewed and discussed. As an investigator, I understand that I am responsible for managing my safety and that of participants throughout this research. I will immediately report any adverse events that occur as a consequence of this research.
Yes

Declaration of conflict of interest: To my knowledge, there is no conflict of interest on my part in carrying out this research.
Yes

Part 2: A

The potential value of addressing this issue

Further details: The purpose of this work is to advance our understanding of the brain-behavioural mechanisms that underlie skilled sequence learning in humans. Results from this project will have relevance to understanding and improving the rehabilitation of a wide variety of sequence learning and control disorders that compromise the patient's ability to perform activities of daily living such as tool use, speech, musical and athletic performance, including dyspraxia, stuttering and task-dependent dystonia [1]. It will also provide avenues to develop protocols to boost sequence learning and control in highly skilled individuals (e.g. musicians and athletes). 1. Sadnicka A, Kornysheva K, Rothwell J, Edwards M (in press). A motor-control framework for task-specific dystonia. Nature Reviews Neurology.

Hypotheses

Further details: A. Spatial and temporal features of action sequences are represented independently. Following training involving the production of spatio-temporally structured finger sequences or naturalistic action sequences, e.g. handwriting, tool manipulation and vocal production, subjects are expected to demonstrate reduced RT costs and higher spatio-temporal accuracy when encountering new spatio-temporal sequence combinations with a trained spatial or temporal feature (transfer). This would corroborate the notion of a separate neural encoding of spatial and temporal action features across a wide spectrum of tasks [1,2,3]. B. Sequence learning can be improved through variation of temporal and spatial features. Our previous studies indicate that subjects with a better performance show a more pronounced transfer of sequence features onto new sequences. A training schedule involving a variable combination of spatial and temporal sequence features as opposed to the repetition of a fixed spatio-temporal combination is expected to result in 1) better performance (RTs, spatial and temporal accuracy) of the latter sequence and 2) in faster transfer of the trained sequence features to novel combinations. This result would suggest that spatio-temporal variability during sequence training has a boosting effect on action sequence production. C. Independence of spatial and temporal features will be dependent on continuity between movement elements. So far spatial or temporal transfer effects sequence representation have been shown for sequences with discrete movement elements (e.g. sequences of finger presses). Movement kinematics like smoothness (jerk; 3rd derivative of position) is predicted to affect the transfer insofar as sequences with lower jerk would show less transfer in terms of temporal and spatial accuracy. This would support the idea that in contrast the speed profile of movements the temporal onset-offset patterns are encoded in the CNS in an abstract manner, independently of the actual movement sequence. D. Competitive queuing of sequence elements can be revealed through RT advantages to element probes during sequence preparation. Neurophysiological evidence in monkeys [4] and in our own work in humans [5] suggest that serial position and timing of movement elements is determined by a parallel retrieval and weighting of movement related activity during sequence preparation (competitive queuing [6]). A confirmation of a behavioural advantage for early vs late sequence elements by showing faster RTs for the former (parametric effect) will open up new avenues of utilizing this simple behavioural measure as an individual marker of competitive queuing during sequence preparation, e.g. when screening for deficiencies and determining the efficacy of training or neurostimulation protocols in healthy subjects and patients. 1. Kornysheva K*, Sierk A, Diedrichsen J (2013) Interaction of temporal and ordinal representations in movement sequences. Journal of Neurophysiology 109(5):1416-1424. 2. Kornysheva K* Diedrichsen J (2014). Human premotor areas parse sequences into their spatial and temporal features. eLife doi: 10.7554/eLife.030433. 3. Diedrichsen J Kornysheva K (2015). Motor skill learning between selection and execution. Trends in Cognitive Science 19(4):227-233. Link 4. Averbeck B et al. (2002). Parallel processing of serial movements in prefrontal cortex. PNAS 99(20):13172-13177. 5. Kornysheva K*, Bush D, Meyer S, Sadnicka A, Barnes N, Burgess N (in preparation). Competitive neural queuing of serial actions reflects abstract timing. 6. Houghton G (1990). The problem of serial order: A neural network model of serial learning and recall. In: Current research in natural language generation, 287-319.

Participants recruitment. Please attach consent and debrief forms with supporitng documents
Further details: Opportunity sampling using SONA, posters, word of mouth, Bangor forum.

Research methodology
Further details: Participants will perform tasks involving instructed finger movements on a response button device or a force transducer keyboard, hand and arm movements manipulating objects and/or tools, hand-writing or drawing, reaching to targets on the table or screen, whole body movements involving playing a musical instrument (piano, violin, cello, percussion etc.), vocal tasks (e.g. sequences of syllables or pseudo-words) and/or viewing objects or videos of others performing actions. During these tasks response times to initiate movements, movement durations, temporal and spatial accuracy, force, response speeds, arm/hand spatial trajectories, and other movement characteristics (kinematics) may be measured. During vocal tasks the sound would be recorded trial-by-trial and analysed with regard to amplitude, duration, temporal pattern and spectral components. In some cases eye movements will also be recorded, and a height-adjustable headrest will be employed to assist the subject in maintaining a constant head position during the task. Recording limb movements will require fixing small reflective or electromagnetic markers to the participant's body which may include fingers, hands, arms, shoulders, legs, feet, head and face depending on the task. Occasionally we will record muscle activity by placing surface EMG electrodes on the subject's skin over the muscles of interest. All participants will be asked to complete the online Edinburgh Handedness questionnaire based on Oldfield 1971 [1]. (http://www.brainmapping.org/shared/Edinburgh.php). 1 Oldfield RC (1971) The assessment and analysis of handedness: the Edinburgh inventory. Neuropsychologia 9(1):97-113.

Estimated start date and duration of the study.
Further details: 01/10/2017 - 01/10/2022

For studies recruiting via SONA or advertising for participants in any way please provide a summary of how participants will be informed about the study in the advertisement. N.B. This should be a brief factual description of the study and what participants will be required to do.
Further details: "We are looking for individuals to participate in a psychology study involving motor learning and control. Our purpose is to better understand how the brain learns and controls highly skilled actions such as speaking, tool use, hand-writing or playing a musical instrument. The study is sponsored by the School of Psychology at Bangor University, and is being carried out under the supervision of Dr Katja Kornysheva. The participation can involve one to three sessions taking place on consecutive days (up to 2 hours per session) and may involve measurements such as finger movements on a response button device or force transducer keyboard, speech recordings and upper or whole body motion capture. In some cases we will measure your movements by attaching small, sphere-shaped markers to your body, e.g. your fingers, arms, shoulders, head or legs. These markers allow us to track your movements in space and time, so that we can estimate things like the position and speed of your body parts over time. In some of our studies, we will also record eye-movements using an eye tracking camera and muscle activity with electromyography (EMG) by placing electrodes on the surface of your skin. We are looking for participants between the ages of 18 and 65 years, with normal hearing and normal or corrected-to-normal vision, who are highly proficient in the English language and have no prior medical history of psychiatric or neurological disorders." Information on payment - Sona and Bangor Forum: "You will be compensated for your participation at a rate of 1 SONA credit per 30min." Information on payment - Community recruitment advert: "You will be compensated for your participation at a rate of £7 per hour."

Part 2: B

Brief background to the study

The hypotheses

Participants: recruitment methods, age, gender, exclusion/inclusion criteria

Research design

Procedures employed

Measures employed

Qualifications of the investigators to use the measures (Where working with children or vulnerable adults, please include information on investigators' CRB disclosures here.)

Venue for investigation

Estimated start date and duration of the study (N.B. If you know that the research is likely to continue for more than three years, please indicate this here).

Data analysis

Potential offence/distress to participants

Procedures to ensure confidentiality and data protection

****How consent is to be obtained (see BPS Guidelines and ensure consent forms are expressed bilingually where appropriate. The University has its own Welsh translations facilities on extension 2036)***

Information for participants (provide actual consent forms and information sheets) including if appropriate, the summary of the study that will appear on SONA to inform participants about the study. N.B. This should be a brief factual description of the study and what participants will be required to do.

Approval of relevant professionals (e.g., GPs, Consultants, Teachers, parents etc.)

Payment to: participants, investigators, departments/institutions

Equipment required and its availability

If students will be engaged a project involving children, vulnerable adults, one of the neurology patient panels or the psychiatric patient panel, specify on a separate sheet the arrangements for training and supervision of students. (See guidance notes)

If students will be engaged in a project involving use of MRI or TMS, specify on a separate sheet the arrangements for training and supervision of students. (See guidance notes)

What arrangements are you making to give feedback to participants? The responsibility is yours to provide it, not participants' to request it.

Finally, check your proposal conforms to BPS Guidelines on Ethical Standards in research and sign the declaration. If you have any doubts about this, please outline them.

Amendment form

Participants' ability to give informed, voluntary consent
No

Participants' ability to give informed, voluntary consent
No

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No

Participants' ability to give informed, voluntary consent
No

Participants' ability to give informed, voluntary consent
No

Participants' ability to voluntarily withdraw from the research
No

Participants' ability to voluntarily withdraw from the research
No

Participants' ability to voluntarily withdraw from the research
No

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No

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No

In questionnaire-based studies, participants' option to omit questions
No

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No

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No

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No

Maintenance of confidentiality of participant data
No

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No

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No

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No

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No

The ability to give a full participant debriefing
No

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No

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No

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No

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No

Risks to participants, investigators, or the institution
No

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No

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Do you intend to use additional questionnaires, please attach copies with supporting documents.
No

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Does the nature of your request entails changes to consent/debriefing information, please attach the amended documents with supporting documents.
No

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Does the nature of your request entails changes to consent/debriefing information, please attach the amended documents with supporting documents.
Yes
Further details: See attached documents.

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Further details: attached.

Amendment declaration

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Declaration of risk assessment: The potential risks to the investigator(s) for this research project have been fully reviewed and discussed. As an investigator, I understand that I am responsible for managing my safety and that of participants throughout this research. I will immediately report any adverse events that occur as a consequence of this research.
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Declaration of conflicts of interest: To my knowledge, there is no conflict of interest on my part in carrying out this research.
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Declaration of data ownership and IPR (for students): I understand that any data produced through this project are owned by the University and must be made available to my supervisor on request or at the end of the project. I confirm that I am aware of the University¿s Intellectual Property Policy and that this research will comply with it.
Yes

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Yes

Part 4: Research Insurance

Is the research to be conducted in the UK?
Yes

Is the research based solely upon the following methodologies? Psychological activity, Questionnaires, Measurements of physiological processes, Venepuncture, Collections of body secretions by non-invasive methods, The administration by mouth of foods or nutrients or variation of diet other than the administration of drugs or other food supplements
Yes

Research that is based solely upon certain typical methods or paradigms is less problematic from an insurance and risk perspective. Is your research based solely upon one or more of these methodologies? Standard behavioural methods such as questionnaires or interviews, computer-based reaction time measures, standardised tests, eye-tracking, picture-pointing, etc; Measurements of physiological processes such as EEG, MEG, MRI, EMG, heart-rate, GSR (not TMS or tCS as they involve more than simple 'measurement'); Collections of body secretions by non-invasive methods, venepuncture (taking of a blood sample), or asking participants to consume foods and/or nutrients (not including the use of drugs or other food supplements or caffine).
Yes