STUDIES INVOLVING THE RECORDING OF ELECTRODERMAL RESPONSES (SKIN CONDUCTANCE) FROM THE HAND

1. SCOPE

Several research groups in psychiatry, experimental psychology and physiological sciences do research involving measurements of electrical activity from the surface of the skin. This is known as the recording of electrodermal activity (EDA), the skin conductance response (SCR) or historically, the galvanic skin response (GSR). EDA has been studied for more than 100 years using similar methodology and indexes the activity of the sympathetic nervous system. It is a simple method to employ and carries no significant risks to the participant.

This approved procedure is intended to be used for studies where participants are adult volunteers. EDA recording is a class B invasive procedure and thus results in the ticking of a shaded box in Section D, Q10 of the CUREC Ethics Checklist. We do not anticipate that where participants are recruited by virtue of their experience of current or prior psychological symptoms (e.g. depression) that this raises any additional issues in relation to the use of EDA recording. Thus this approved procedure is equally applicable for studies of this nature. However it is possible that the inclusion of such participants may raise other ethical issues. This approved procedure does not seek to address these and independent ethical scrutiny or reference to other approved procedures and guidelines may be required.

The EDA recording provides a measure of changes in the electrical conductance or resistance of the skin that originate primarily from movement of sweat within the eccrine sweat ducts. EDA fluctuates spontaneously and also in response to the presentation of stimuli which are novel, unexpected or significant, or by the omission of an expected response. A basic distinction can be made between tonic and phasic EDA. Phasic EDA refers to changes in EDA (increases or decreases in resistance/conductance) that are superimposed on a background – tonic – level of activity. EDA can be quantified in a number of ways. Sometimes researchers will be interested in spontaneous fluctuations in EDA (non-specific skin conductance responses – NS-SCR) whilst at other times they will be interested in changes in skin conductance in response to the presentation of particular stimuli or the participant’s conduct of particular activities (event-related SCR – ER-SCR).

A number of measurements of SCR can be derived. These include frequency over a particular recording period, amplitude (the mean amplitude averaged across trials where an ER-SCR is observed) and magnitude (the mean maximum amplitude averaged across all trials). These measures are derived through off-line analysis of data collected during experimental sessions. Usually a latency window of 1-4 seconds post-stimulus presentation is employed in order to identify skin conductance responses that are likely to originate from the stimulus presentation. On some occasions a longer post-stimulus window may be utilised, depending on the nature of the stimulus.

In experimental paradigms, the SCR is usually recorded whilst people view stimuli, perform cognitive tasks or sit at rest. Recording of the SCR is achieved by measurement of current flow between two electrodes placed on the skin of the fingers or palm (see below for precise locations). A constant voltage is maintained between the two electrodes such that current flow reflects the reciprocal of skin resistance.
Electrode placement and preparation should typically take no more than 5 minutes. The participant is asked to wash their hands with a non-abrasive soap prior to electrode placement. Depending on the set-up employed, two electrodes will then be attached to either the volar surfaces of the medial phalanges, the volar surfaces of the distal phalanges or thenar and hypothenar eminences of the palms. Electrodes are usually attached to the non-dominant hand since this is less likely to be affected by cuts or callouses and since this leaves the dominant hand free to make responses (e.g. button presses). Silver-silver chloride cup electrodes are typically used. In order to establish electrical contact between the skin surface and the electrodes, a unibase electrolyte paste is inserted into the cup electrodes, which can be attached to the skin surface either using double-sided adhesive collars, or in some custom made systems via specially designed Velcro pouches.

Usually after the electrodes have been applied the participant will be asked to sit at rest for a few minutes to stabilise SCR activity before beginning cognitive tasks.

2. **TRAINING OF RESEARCH STAFF**

Training in application of electrodes and setting up the recording should be given by an experienced researcher, and no inexperienced person should be left in sole charge of an SCR study.

3. **METHODS FOR RECRUITING PARTICIPANTS**

Participants for SCR studies are typically recruited via posters around the University (see example attached). It is acceptable to mention rewards in recruitment advertisements for this kind of study, where competent adults volunteer themselves to take part, and there is no significant risk to the participant other than boredom.

4. **INFORMATION PROVIDED TO PARTICIPANTS**

The specific details provided to parents will vary depending on the study, but will always be on University headed paper and will always include:

- the name of the study
- the name(s) and status(es) (e.g. doctoral student) of the researchers carrying out the study and how to contact them
- a brief rationale of the study, including its purpose and value
- why potential participants are being invited to take part in the research
- an explanation of what the potential participant would do, including estimated duration of the test session and where it would take place
- that potential participants can ask questions about the study before they decide whether to participate
- that potential participants can choose whether they participate and, if they agree, they may withdraw from the study without penalty at any time by advising the researchers of this decision
- information about any additional personal information that would be obtained
- information about who would have access to the data, how it will be stored and what will happen to the data at the end of the study
Central University Research Ethics Committee (CUREC)

Approved Procedure: IDREC_14_Version 2.1

Title: Studies Involving the Recording of Electrodermal Responses (Skin Conductance) from the Hand

- statement that the data would be anonymised
- what benefits (direct or indirect) may accrue to the participants in the study
- what risks are involved in the study
- that the project has received ethics clearance through the University of Oxford’s ethical approval process for research involving human participants.
- where applicable, a note to explain that the research will be written up as a student’s thesis and how the personal data included in that thesis will be published and stored
- the procedure for raising a concern or making a complaint

The information sheet will also explain that the study carries no significant personal risk and that the data will be anonymised.

In addition, a verbal explanation will be given to all participants by the researcher conducting the study.

The Information Sheet is written in simple but non-patronising language. Most word-processing packages provide readability statistics for a document, and one should aim for a 12-year-old (Year 7) reading level for adults.

Please refer to the Information Sheet associated with this Approved Procedure.

5. CONSENT OF PARTICIPANTS

All participants sign a consent form which will always be on University headed paper and will always include:

- the name of the study
- the name and status (e.g. doctoral student) of the researcher collecting the information and how to contact him/her
- the purpose of the study
- declarations that the participant:
  - has read the participant information sheet
  - has had the opportunity to ask questions about the study and has received satisfactory answers to questions, and any additional details requested
  - understands that s/he may withdraw from the study without penalty at any time by advising the researchers of this decision
  - understands that this project has received ethics clearance through the University of Oxford’s ethical approval process for research involving human participants
  - understands who will have access to personal data provided, how the data will be stored; and what will happen to the data at the end of the project
  - agrees to participate in this study

Participants will sign, print and date their names and the researchers who secure the consent will also sign, print and date their names.

Please refer to the Consent Form associated with this Approved Procedure.
Current guidance on the informed consent process can be found at:
http://researchsupport.admin.ox.ac.uk/governance/ethics/resources/consent

6. **FINANCIAL AND OTHER REWARDS TO PARTICIPANTS**

Participants are typically rewarded with payments or vouchers for music or books to compensate them for the time spent in the study.

7. **POTENTIAL RISKS TO PARTICIPANTS/RESEARCHERS/OTHERS AND WHAT WILL BE DONE TO MINIMISE**

   7.1. **Risks to participants**

   SCR recording has been used safely for many years, and we are aware of no cases of adverse events. During the session, participants are asked to indicate if they feel any discomfort, in which case the procedure is stopped. It is possible to pause the procedure if a participant needs to take a break or visit the bathroom, or if a fire alarm goes off.

   Skin conductance responses vary from individual to individual. Researchers undertake not to make any judgemental comments on the type of responses seen in individual participants, to avoid causing unnecessary anxiety. E.g. the researcher should not make a comment such as “you’ve only got very small SCR responses”.

   One consideration for researchers is hygiene: the sensors and instruments used to apply gel should be disinfected after each use.

   7.2. **Risks to researchers**

   Again, the main way to avoid risk is to adhere to a regime of hygiene. Hands are washed after any contact with the participant.

8. **MONITORING AND REPORTING OF ADVERSE OR UNFORSEEN EVENTS**

If a participant should become unwell during the test session, the session will be terminated. Such a case would be reported in the Departmental Safety Book.

9. **DATA PROTECTION ISSUES**

Each participant is given a code number, and this, rather than the name, is used to label all data from the study, including computerised SCR files and any paper records. If it is necessary to retain any personal information (e.g. contact details in the case that participants may be re-tested) the key linking codes to personal details will be kept in a locked filing cabinet.

Data will be stored for a period of 10 years in accordance with guidelines imposed by major funding bodies. At the end of this time it will be destroyed.
Title: Studies Involving the Recording of Electrodermal Responses (Skin Conductance) from the Hand

10. CHANGE HISTORY

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Retitled ‘Approved Procedure’ (previously ‘Protocol’). Approved by CUREC, 19 November 2015</td>
<td>N/A</td>
</tr>
<tr>
<td>2.1</td>
<td>Updated hyperlinks for new CUREC website</td>
<td>2.0</td>
</tr>
</tbody>
</table>