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*Make things as simple as possible, but
not simpler. Einstein*

GSR Experiments

Experiments from the Science Fair Electronic Lie Detector Project Kit copyright 1970 by Radio Shack and reprinted here with permission. However, they can be used with any GSR measuring device.

EXPERIMENT 1 – Breathing

Ask the subject to take a very deep breath. You will observe the sound increases in pitch. This indicates his skin resistance has dropped due to the activity of the sweat glands. The slight muscular effort of taking a deep breath causes the sympathetic nervous system to send impulses to the sweat glands which in turn reduces the skin resistance. The change in skin resistance is called a GALVANIC SKIN RESPONSE. It is usually abbreviated to GSR by psychologists. If you are acting as the subject, can you detect your normal breathing cycles? There are great individual differences which will be observed in these experiments. Some people produce large responses just by talking. Conversely, others will produce only a slight response even if they are kicked in the shins.

EXPERIMENT 2 – Muscle Tension

Direct the subject to squeeze a rubber ball hard for several seconds, or curl his toes and release them. Next, tense the stomach muscles, or some similar activity requiring muscular exertion. Which activity produces the most response? In doing these experiments the subject should keep the hand with the electrodes very still if possible. Allow at least 15 to 20 seconds for rest between tests

EXPERIMENT 3 – The Effect of Temperature on the Galvanic Skin Response

Request the subject to stand outside for a few minutes if it is cold and repeat experiment 1. What results do you get? Give him a few minutes to warm up and try the experiment again. Are the results any different? If possible have the subject remain in a very warm place for a while and try Experiment 1 on him. Have him hold some ice cubes for a short interval; re-test him.

EXPERIMENT 4 – Position of the Electrodes

By now you have probably discovered that a deep breath will usually give a good galvanic response. Try placing one electrode on one hand and one electrode on the other hand. Do you notice any difference? If you are careful, you can try holding the electrodes firmly to other places of the skin. Can you still get good results? As a result of this experiment, what conclusions can you draw about the distribution of sweat glands in the skin?

EXPERIMENT 5 – Experiments With More Than One Person

Put one electrode on one person and the other electrode on another person. Have the two people hold each others hands which are not connected to the electrodes. Try any of the previous experiments on each person separately and on both together. Or place several persons in a chain with the electrodes at the end of the chain, and try

experiments on these subjects tied together in series like batteries or other electric elements.

EXPERIMENT 6 – The Effects of Relaxation

Place the electrodes on a subject as previously described. Instruct him to relax as much as possible. Have him shut his eyes and sit or lie quietly. What happens? When a person relaxes his skin resistance increases. The instrument reflects this change. Perhaps you can see how a device might be made which would wake a person up whenever he fell asleep.

EXPERIMENT 7 – The Effects of Pain

Ask the subject to pinch himself or bite his lip or finger. Any painful stimulus will produce large galvanic skin responses. In general the instrument will indicate strong, pleasant or unpleasant emotions. It will also react when a subject is startled, under tension, nervous, or exerting unusual mental effort. The experiments outlined below are just some of the many possible ones that can be tried.

EXPERIMENT 8 – The Startle Response

When the electrodes have been placed on a subject and he has remained quiet for 30 seconds, suddenly clap your hands loudly together, or strike your fist on the table. You will observe a large galvanic skin response. You will notice that the instrument does not respond until some time after the strong stimulus. This time delay is typical with the galvanic skin response and is designated as the LATENCY of the response. It may vary from one to three seconds. Part of the reason for the time delay or latency of response is the addition of a chemical reaction with the electrical reaction. A chemical reaction is usually slower in response than electrical reactions. Try different methods of startling the subject, such as a flash of light, a slight electric shock, etc. A pronounced reaction may result from a very mild stimulus.

EXPERIMENT 9 – Adaptation and Recovery

Select a standard method of startling the subject which can be regulated and repeated at approximately the same strength every time. Repeat this stimulus at intervals of not less than 30 seconds. What happens to the galvanic skin response? You will note that they rapidly decrease until practically no response can be observed. This reaction is called ADAPTATION by psychologists. Next, do not startle the subject for several minutes. It is advisable to loosen or remove the electrodes occasionally to allow the blood to flow and the skin to breathe. Suddenly repeat the startle stimulus to the subject. You will probably observe a large galvanic skin response. This is called RECOVERY. How many trials does it take for adaptation to re-occur now as compared with the first time?

EXPERIMENT 10 – Word Association Tests

Most sensory stimuli so far considered have acted directly, or nearly so, on the nervous system to produce a galvanic skin response. If abstract stimuli such as words are presented to the subject, the effect on the nervous system is usually indirect and due to the meanings associated with the words. Pictures or music may also produce galvanic skin response. Psychologists have often tested the effect of words on subjects by presenting them one at a time and noting their reactions. There are some words which nearly all people will react to and others which will produce no noticeable reaction. Below is a list of words which you can read to a subject and observe his galvanic

skin responses. Read the words slowly and clearly. Pause at least three seconds between each word to allow time for a reaction to occur; otherwise you will not be able to tell which words are associated with large responses. The words with the asterisk have been found to produce galvanic skin responses in most subjects. You can make up your own:

carrot kiss* can white give ball gross subject's name*

paper woman* sand mother* pencil love* read afraid*

walk proud* flower fry pond marry*

You can easily observe an adaptation effect by repeating those words to which the subject gave large responses.

EXPERIMENT 11 – Apprehension

Most subjects will give a galvanic skin response if they are apprehensive or if they expect that something is about to happen to them. You may startle a subject by a loud noise or a sudden light blow, or you may pinch him but all this is not necessary. Merely remark casually to an onlooker – “Let’s see what a good pinch will do.” and reach out a hand toward the subject. This will often give nearly as large a response as an actual pinch. You may pretend to touch electric wires to the subject to give him a shock and also obtain a galvanic skin response. These results depend on many factors, such as your personality, the subject’s personality, how well the subject knows you, how many people are present and how many of them are strangers to the subject. It is difficult to control all these factors and you should not be surprised if you do not obtain consistent results.

EXPERIMENT 12 – The Effect of Touch

It is possible to use very weak stimuli with a subject who is apprehensive or otherwise a bit frightened of this instrument. Merely reach out and touch the subject lightly on the hand. You may, after, obtain a large galvanic skin response with this very slight stimulus. How do you account for this?

EXPERIMENT 13 – Mental Effort

Any difficult mental task will often produce a galvanic skin response. Ask a subject to solve an arithmetic problem in his head such as, what does $6+3-5 \times 4+7+836 = ?$ You may also try asking him to solve a difficult problem, define a hard word, spell a difficult word, read small print at a great distance, etc.

EXPERIMENT 14 – A Game

Ask the subject to write a number from 0 to 10 on a piece of paper. No one should watch him or look at the number. Then make repeated guesses of the number. When you guess the correct number, the instrument should show it. The subject may try to fool the device by laughing, tensing, coughing, or relaxing as much as possible. You may try other variations of this by using playing cards or by having the subject hide an object while others are out of the room. The subject may either deny everything or may say nothing.

EXPERIMENT 15 – A Lie Detector

Ask the subject a few simple questions for which you know the correct answer, and observe his response. A lie will be indicated by a galvanic skin response – a lowering of skin resistance. This will occur from one to four seconds after the answer has been given. For this reason, it is important to space the questions at least ten seconds apart. A simple question such as “how tall are you?” will usually produce a large response if the person lies about it. Sometimes a response will be observed before the question is actually asked. This is a result of the emotional activity which the person undergoes when he anticipates a revealing question. One simple procedure is to show the subject a playing card and ask him to name it. After a few preliminary trials where he tells the truth (by request) he may then be permitted to lie. The first lie will probably be clearly indicated. After catching a subject once in a lie, drop this method because most people quickly become practiced at lying about such a simple thing. A similar technique can be attempted by using a coin and asking the subject to name it after it is flipped and shown to him. Note: People vary greatly in their responses. Some are very practiced liars, and a simple, non-emotional or unimportant lie can readily be told without being detected by this device. Also, nearly everyone can learn, in the process described above, to lie in a relaxed manner. These factors require that the operator be both skilled and practiced in the measurement of the galvanic skin response.

EXPERIMENT 16 – Conditioning

This is a difficult experiment to do, even for professional psychologists, so do not be concerned if you do not obtain good results. Some subjects are better for this experiment than others and you may have to try two or three. Instruct the subject to assume a relaxed position. Get two stimuli ready for presentation to the subject. One of the stimuli should be very weak so that by itself it will not produce a galvanic skin response. This may be a small light, a quiet doorbell, or a spoken word. The second stimulus should be strong enough to definitely produce a good galvanic skin response. It may be a very loud sound, such as that made by a hammer on a pan, or it may be a light blow on the arm or a pinch. etc. First demonstrate that the weak stimulus alone produces no galvanic skin response. Then present both stimuli at nearly the same time to the subject. (You may need two people to do this.) For best results the second, strong stimulus should be given about one-half second after the weak stimulus. Repeat this at intervals of about thirty seconds for three to six times. Then, without forewarning the subject, do not give him the second, strong stimulus. Do you observe that he gives a good galvanic skin response anyway? If he does, he is said to be **CONDITIONED**. He has responded to the weak stimulus as if it were the strong stimulus. He is apparently unable to distinguish the two stimuli. The response resulting from the weak stimulus which formerly did not produce a response is said to be a **CONDITIONED RESPONSE**.

EXPERIMENT 17 – Extinction of a Conditioned Response

Repeat Experiment 16 to obtain a strong conditioned response. His conditioned response will probably be less. Repeat the weak stimulus again at intervals and you will observe that his galvanic skin response will gradually decrease and soon become unobservable. (This is similar to the adaptation experiment.) This process is called **EXTINCTION**.

EXPERIMENT 18 – Spontaneous Recovery

Repeat Experiment 17. Give the subject a ten or fifteen minute rest and then attach the electrodes to him again. Do not tell him what you are going to do, and present to him the first weak stimulus again. You may observe that he again gives a conditioned response. This is called **SPONTANEOUS RECOVERY**. The initial weak stimulus has

again recovered its power to produce a strong response. You can again extinguish this spontaneous recovery and after a further rest observe a second recovery. You can recondition him at any time by presenting both stimuli together as in Experiment 16. Try variations of this experiment and others described in this manual and see what you can discover Psychology is still an open science.

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