GSR

# Introduction

This paper examines the skin conductance responses to different words (categorized as either neutral, emotional or sexual), also referred to as galvanic skin response (GSR) (Critchley, 2002).

Emotions can be examined physiologically because they are closely linked to sympathetic nervous activity (Purves et al., 2013). When sympathetic drive increases, autonomic arousal occur. Such responses are for instance expressed through blood pressure, heart rate and sweat (Critchley, 2002). GSR measures sweat gland activity through mechanical friction. A strong emotion will be manifested in the sweat glands and therefore be measurable in the electrodermal activity (Critchley, 2002).

We expect sexual and emotional words to elicit stronger emotional responses than neutral words, therefore showing increased GSR scores, with sexual words displaying the highest scores. Further, we expect longer reaction times (RT) for emotional words, and longest RT for sexual words, compared to neutral words. Lastly, we thus expect GSR scores and RT scores to be coherent.

# Method

This experiment included *N* = 285 participants (List 1: *n* = 157, List 2: *n* = 128), all psychology students at UCPH. Age and sex differences were not considered. Results were obtained from experiments conducted in years 2016-2019.

## Materials

* GSR apparatus
* Electrodes
* Tape
* Stopwatch
* Word lists 1 and 2 (60 words per list)

## Test procedure

The experimenter (E), an observer (OB), and the participant (P) were present during the study. Prior to the initiation of the experiment, P washed hands to better GSR conduction. E ensured that skin of P’s non-dominant index and middle fingers was intact and placed two GSR-electrodes on these fingers, secured with tape.

Function of the GSR apparatus was tested using the Basal Skin Resistance (BSR) function. P was placed facing away from E and GSR apparatus with the non-dominant hand resting on the table without the electrodes touching the table. The apparatus was set to GSR function at 10 k.

P was instructed of the procedure by E, and a test trial was run. Following, E initiated the experiment. One of two lists was used for each trial: both contained neutral (40 items), emotional (10 items), and sexual (10 items) words, but the emotional and sexual words of List 2 were designed to be more agitative than those of List 1. E read aloud a stimulus word from the list, and P responded as fast as possible with the first associated response word that came to their mind. RT was recorded as time from stimulus to response word. OB recorded GSR-fluctuations at 1.5-3 seconds after the stimulus word and noted response words.

# Results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 1: *Mean RTs and GSR-fluctuations for every word condition* | | | | | |
| Word condition | RT | |  | GSR-fluctuations | |
| *M* | *SD* |  | *M* | *SD* |
| Neutral words | 2.32 | (0.64) |  | -0.31 | (0.12) |
| Sexual words | 3.23 | (1.19) |  | 1.01 | (0.41) |
| Emotional words | 2.86 | (1.23) |  | 0.22 | (0.29) |

*Note: RT is measured in seconds, GSR-fluctuations are stated as z-scores. N = 285*

## RT is longer for sexual words condition

A mixed ANOVA was conducted to test if RT was significantly influenced by word condition (neutral, sexual, or emotional) as a within-subjects factor and list (List 1 versus List 2) as a between-subjects factor.

The test showed a significant main effect of word condition, *F*(1.96, 553.52) = 146.78, *p* < 0.001, = .34 (Huyhn-Feldt corrected), but no significant main effect of list, *F*(1, 283) = .12, *p* = .73, < .001. There was a significant interaction between word condition and list, *F*(1.96, 553.52) = 4.50, *p* = .01, = .02.

This means that RT depend on word condition, and that the effect of word condition varied between the two lists.

Paired samples *t*-tests showed significant differences in mean RT between neutral (*M* = 2.32, *SD* = 0.64) and emotional (*M* = 2.86, *SD* = 1.23) conditions, *t*(284) = 10.33, *p* < .001, *d* = 0.58, between neutral and sexual (*M* = 3.23, *SD* = 1.20) conditions, *t*(284) = 18.33, *p* < .001, *d* = 1.00, and between emotional and sexual conditions, *t*(284) = 6.47, *p* < .001, *d* = 0.31.

Thus, RT for the sexual words condition was significantly longer than RT for any of the other conditions, as expected. This was likewise the case for FP19201, see Figure 1, further supporting our hypothesis. FP19201 was tested using List 1, suggesting that even sexual and emotional words that were not considered very agitative, compared to those of List 2, elicited stronger responses than neutral words, indicating that the effect is readily present.

Figure 1: Graph showing RT for FP19201, list 1

## GSR-response is higher for sexual words condition

A mixed ANOVA was conducted to test if GSR-fluctuations were significantly affected by word condition and word list.

The test showed a significant main effect of word condition, *F*(1.73, 489.43) = 1112.05, *p* < .001, = .80 (Huyhn-Feldt corrected), but no significant main effect of list, *F*(1, 283) = .03, *p* = .86, < .001, and no significant interaction between word condition and list, *F*(0.45, 489.43) = 2.02, *p* = 0.14, = .007 (Huyhn-Feldt corrected).

This means that GSR-fluctuations depend on word condition, and the effect of word condition did not vary significantly between the two lists.

Paired samples *t*-tests showed significant differences in mean GSR-fluctuations between neutral (*M* = -0.31, *SD* = 0.12) and emotional (*M* = 0.22, *SD* = 0.29) conditions, *t*(284) = 24.48, *p* < .001, *d* = 2.58, between neutral and sexual (*M* = 1.01, *SD* = 0.41) conditions, *t*(284) = 44.43, *p* < .001, *d* = 5.05, and between emotional and sexual conditions, *t*(284) = 24.99, *p* < .001, *d* = 2.26.

This implies that word condition matters greatly for GSR-fluctuations and that the sexual words condition has a greater effect on GSR than the emotional words condition. This was likewise the case for FP19201 who showed the greatest GSR-fluctuation levels above sample mean for sexual words, as well as GSR-levels above sample mean for emotional words, but fluctuations below sample mean for neutral words, illustrated in Figure 2.

These results generally support our hypothesis, although it was further expected to see a significant main effect of list, as List 2 contains more agitative emotional and sexual words than List 1.

Figure 2: Graph showing GSRz for FP19201, list 1

## Correlations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 2 | | | | | |
| *Correlations between RT and GSR-fluctuations* | | | | | |
|  | RT\_Sex | RT\_Emotion | GSRz\_Neutral | GSRz\_Sex | GSRz\_Emotion |
| RT\_Neutral | .74\*\* | .74\*\* | .18\*\* | -.20\*\* | -.03 |
| RT\_Sex |  | .68\*\* | .10 | -.08 | -.05 |
| RT\_Emotion |  |  | .09 | -.13\* | .04 |
| GSRz\_Neutral |  |  |  | -.77\*\* | -.49\*\* |
| GSSz\_Sex |  |  |  |  | -.14\* |
| Note: \**p* < .05, \*\**p* < .01 | | | | | |

Figure 3: Graph showing correlation between GSRz and RT for FP19201

A Pearson’s correlation showed a significant correlation between RT and GSR-fluctuations for the neutral words condition (*r* = .18, *p* = .002). However, this correlation is rather weak. No significant correlations were found between RT and GSR-fluctuations for the emotional and sexual words conditions respectively. This does not provide strong support for the hypothesis that RT and GSR-responses should be positively correlated.

# Conclusion

Results of this experiment provide evidence for the hypothesis that sexual and emotional words elicit stronger GSR-responses, reflecting stronger emotional responses, than do neutral words, with sexual words eliciting the strongest response.

# References

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