# Autonomic responses to threat perception: analysis of the electrodermal activity and facial temperature variation

Luca Guido Valla [1-2], Noellie Brockdorff [1], Irena Chiru [2]

[1] *Department of Cognitive Science, University of Malta*

[2] *"Mihai Viteazul" National Intelligence Academy*

## INTRODUCTION

We aimed to test the level of emotional arousal when experiencing a personal security threat and a global security threat. We also aimed to test whether participants, when experiencing a global security threat, experience outwardly directed emotions (i.e., anger) characterised by higher facial temperatures than the control condition. In contrast, when processing an individual threat, it is hypothesized that participants will display lower temperatures than the control condition, due to the experience of inwardly directed emotions (i.e., fear). These hypotheses are consistent with the Integrated Threat Theory, proposed by Stephan and Renfro, in 2002 [1]. According to the existing literature, anger is related to an increase of skin temperature whereas fear to a decrease [2].

## METHOD

### Sample

Ten people (4 females / 6 males, mean age = 25 years, range = 18-45, SD = 7.38) completed the experimental tasks.
All participants reported no history of diagnosed mental disorders, cerebral damage, drug abuse and/or diagnosed cardiovascular or respiratory conditions. All, except one participant, were righthanded.

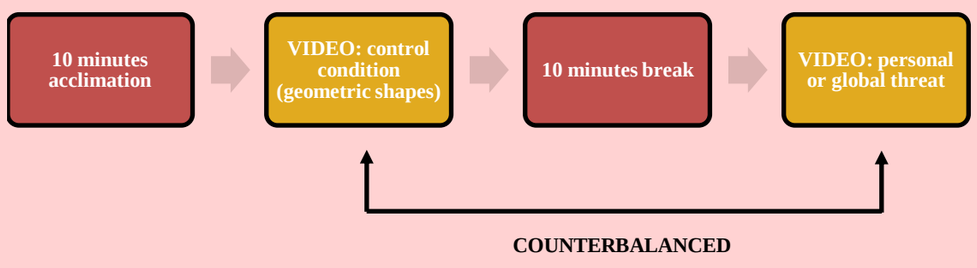
### Stimuli

GLOBAL THREAT


INDIVIDUAL THREAT

CONTROL CONDITION

### Procedure




### Analysis

We carried out paired sample t-tests and split-plot ANOVAs for the following measures: temperature of the forehead, temperature of the tip of the nose, Skin Conductance Level (raw data), skin conductance level (range corrected data). One of the independent variables is a fixed factor (between subjects, i.e., threat condition) and the other variable is a repeated measures (within subjects, i.e., active VS control condition).

## RESULTS

The results of the split-plot ANOVA and t-test showed a greater level of arousal in the global threat condition. In particular, the split-plot ANOVA for the Skin conductance level (raw data) showed that the "difference of the difference" of the two experimental conditions (individual and global threat perception) is statistically significant: the difference in the level of arousal between the control and active condition for the global threat condition is much greater than for the individual threat condition.

The split-plot ANOVA carried out taking the temperature of the tip of the nose as the Region Of Interest showed that the "difference of the difference" of the two experimental conditions (individual and global threat perception) is statistically significant, also for this measure. The difference in the level of arousal between the control and active condition for the individual threat condition is, in this case, greater than for the global threat condition.

*Experimental apparatus*


*Thermogram*

## DISCUSSION

Overall, results showed a greater level of arousal in the global threat condition. A significant difference between the control and active condition has been found also for the individual threat condition (temperature variation of the tip of the nose) but with a smaller effect size. The first hypothesis (higher level of arousal in the active conditions) has been confirmed, while the second hypothesis (differentiated thermal response to different types of threat) has been rejected. These preliminary results, if confirmed with further research, may be relevant for the scientific community, since they showed differentiated somatic responses to threats.

## REFERENCES:

1. Stephan, W. G., & Renfro, C. L. (2002). The role of threat in intergroup relations. In D. M. Mackie & E. R. Smith (Eds.), *From prejudice to intergroup emotions* (pp. 191–207). New York: Psychology Press.
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Luca Guido Valla: lvall02@sec.research.um.edu.mt