

# Negative emotions elicited by spiders: A psychophysiological study

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## Introduction

Spiders often trigger strong negative emotions (e.g., fear and disgust), and arachnophobia belongs to the most common specific phobias worldwide. However, different spider species (morphotypes) might differ in the predominant elicited emotion or their intensity, both during a self-reported evaluation and physiological measures.

## Main questions

- Is there a significant difference in physiological responses to different morphotypes of spiders?
- What is the relationship between physiological response and self-reported evaluation?
- What is the effect of the stimulus presentation context (neutral background vs. human hand, photo vs. video)?
- Is there a difference between respondents with different levels of spider fear (SPQ) and between respondents from different European countries?



Fig. 1: VLV 3 polygraph for physiological measures

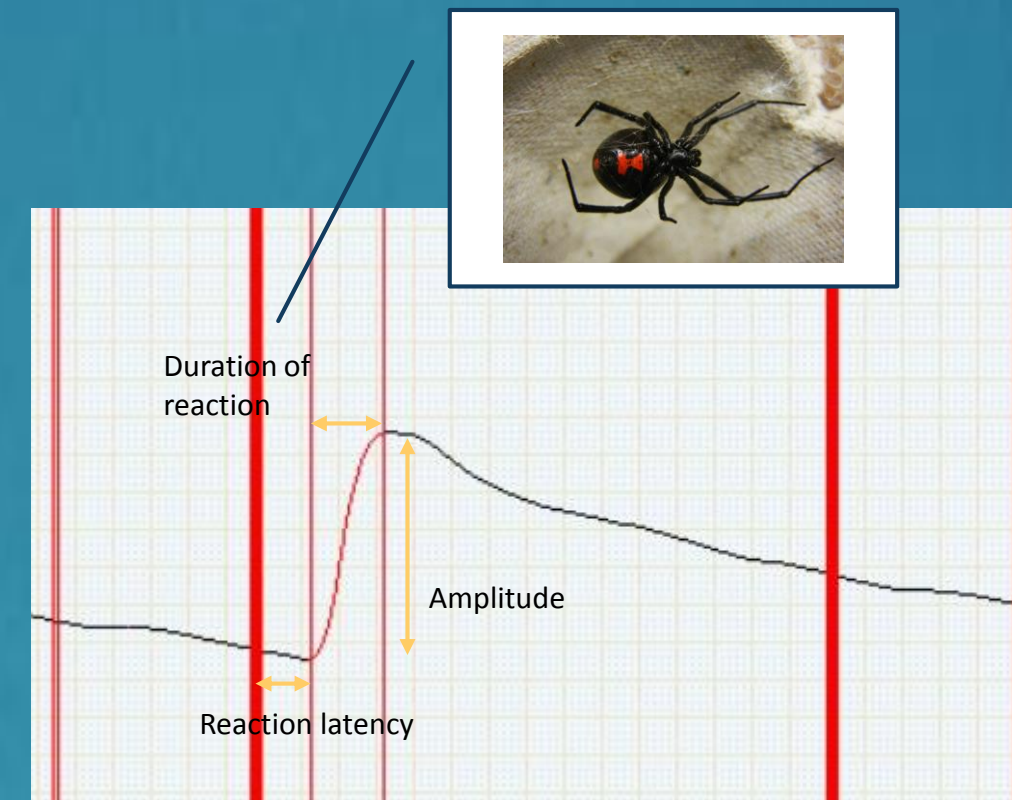


Fig. 2: Shape of the skin resistance change curve after an emotionally salient stimulus onset (*Latrodectus mactans*).

## Methods

- VLV 3 polygraph – skin resistance (SR) change (amplitude, duration, number of reactions)
- Stimuli: 3 morphologically distinct categories of spiders with different levels of potential threat and different levels of elicited fear/disgust: type tarantula (*Brachypelma vagans*), domestic house spider (*Tegenaria domestica*) and black widow (*Latrodectus mactans*)
- Control stimuli: tree leaves
- Stimuli presentation: photographs and short videos (5s), on a neutral background or crawling on a human hand
- Self-reported measures: psychological questionnaires SPQ (fear of spiders) and DS-R (measuring general disgust propensity); stimuli scoring on a 7-point scale according to elicited fear and disgust
- Respondents: n = 260; mainly students from the Czech Republic and other European countries (Erasmus+ programme) with different levels of fear of spiders



Fig. 3: Examples of stimuli used in the photo and video presentations (*Brachypelma vagans*, *Tegenaria domestica*, *Latrodectus mactans*)

## Czech respondents

### Self-reported evaluation

- The most fear- and disgust-evoking spider was a **black widow**
- The presentation condition (hand, video) had no significant effect
- The correlations between self-reported evaluation of spider stimuli and their mean physiological response were not significant



## Erasmus respondents

### Self-reported evaluation

- The most fear- and disgust-evoking spider was a **tarantula**
- The presentation condition (hand, video) had no significant effect
- The correlations between self-reported evaluation of spider stimuli and their mean physiological response were not significant



## Is there a difference in psychophysiological response to different spider morphotypes?

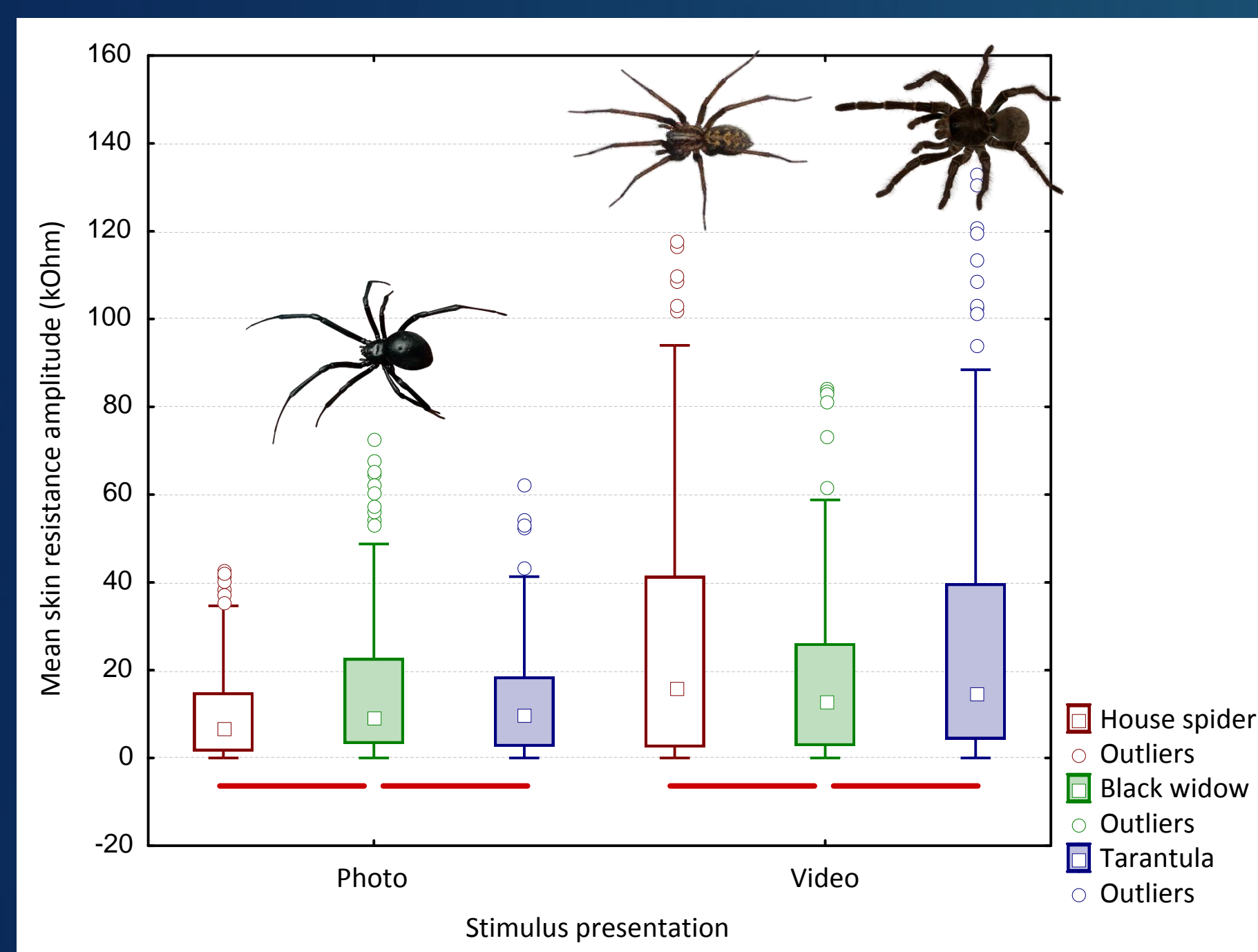
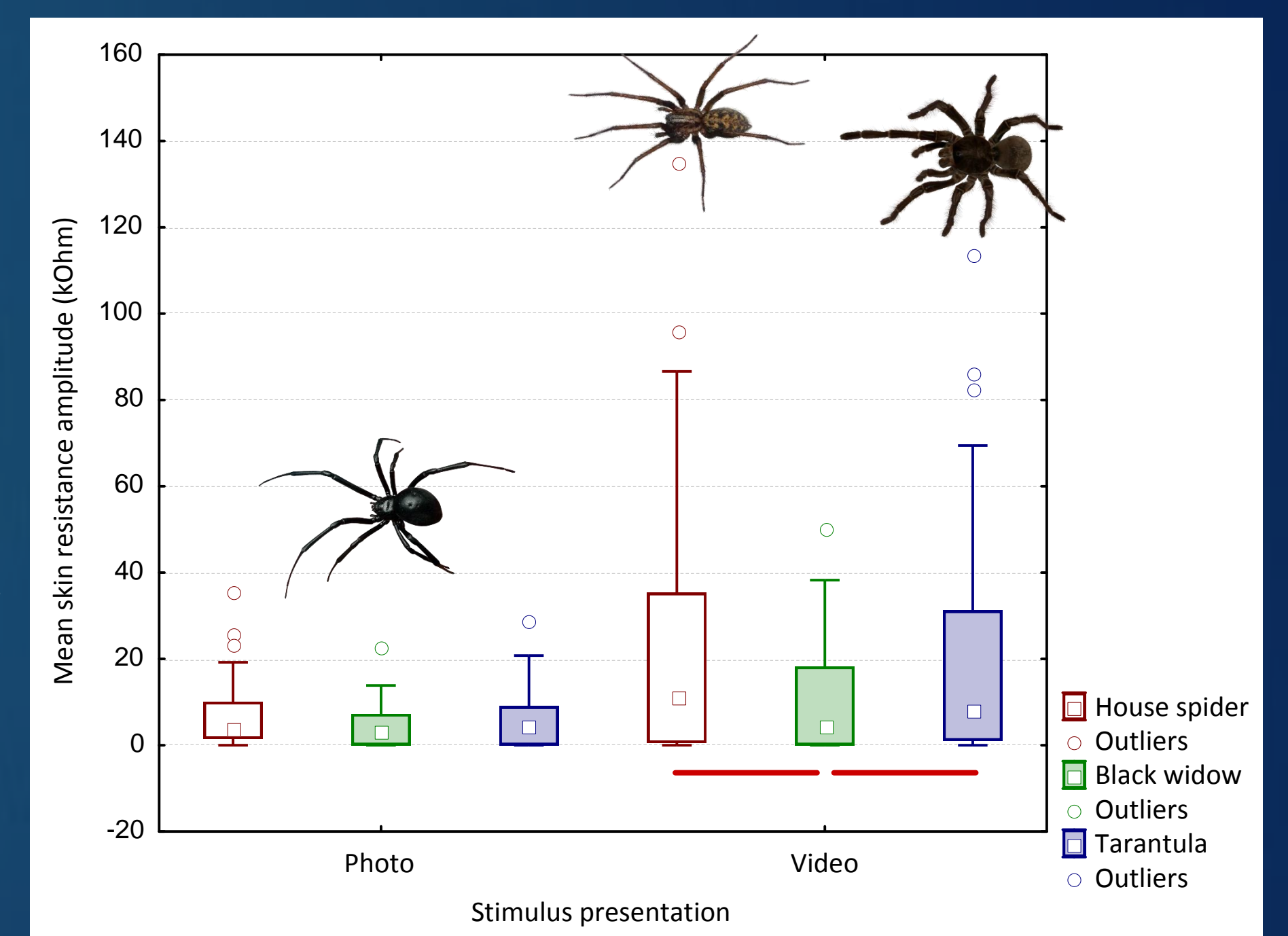


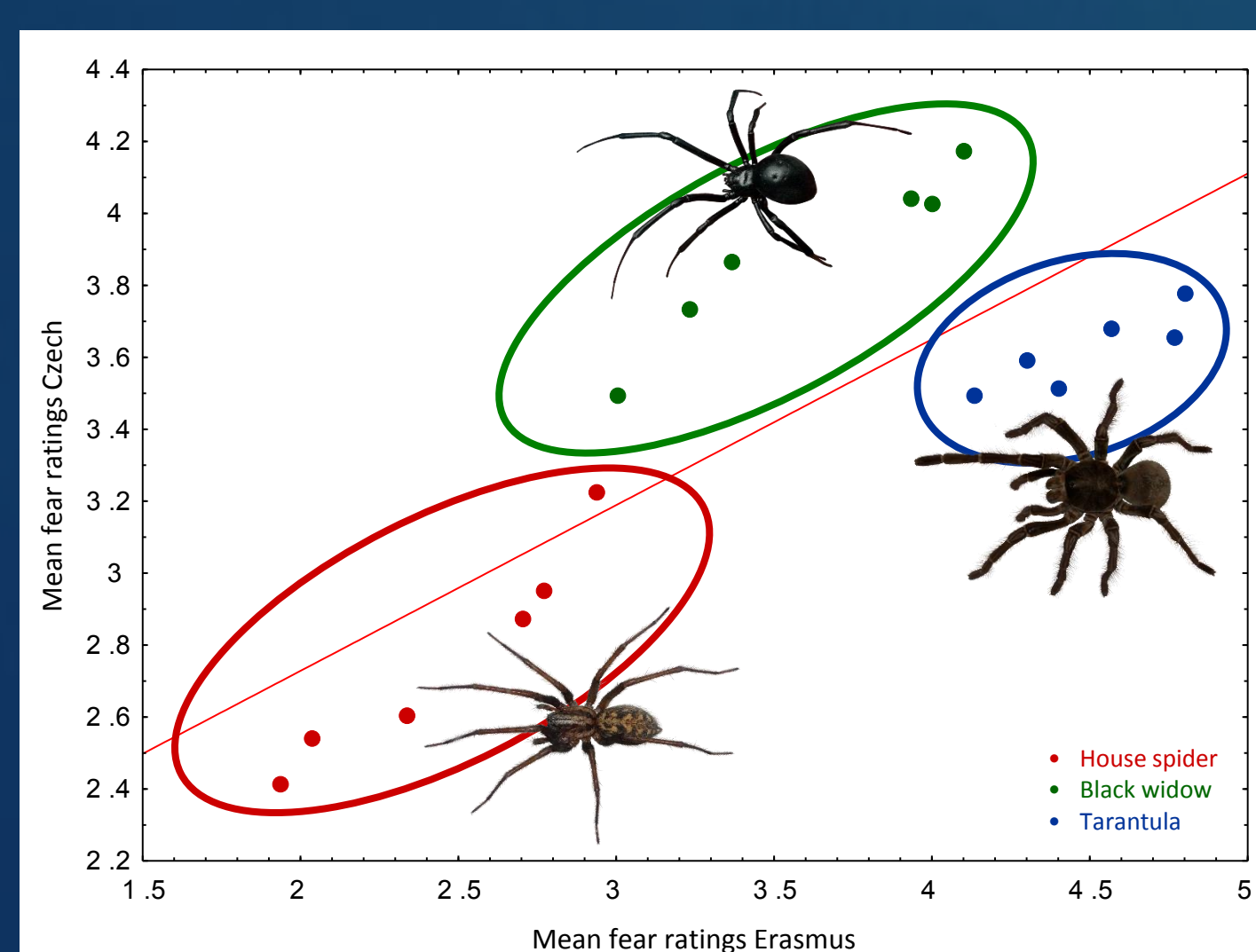
Fig. 4: Mean SR amplitude in reaction to three different spider morphotypes presented as photos and videos. The domestic house spider elicits the lowest reactions in the photo category and the black widow in the video category (significant values are marked by a red line). There was a positive effect of SPQ scores as subjects with higher fear of spiders showed stronger SR responses to all spider stimuli (M-W Z = -4.74,  $p < 0.0001$ ).

Fig. 5: Mean SR amplitude in reaction to three different spider morphotypes presented as photos and videos. The differences between photo stimuli were not significant, whereas the black widow elicited significantly lower reactions in the video category (significant values are marked by a red line). There was a positive effect of SPQ scores as subjects with higher fear of spiders showed stronger SR responses to all spider stimuli (M-W Z = 2.6376,  $p = 0.0084$ ).



## Czech vs. Erasmus respondents

Fig. 6: Correlation of mean fear scores of the spider stimuli between Czech and Erasmus respondents:  $R^2 = 0.6416$ ,  $p = 0.0001$ . For the disgust scores, the correlations were somewhat lower:  $R^2 = 0.4500$ ,  $p = 0.0023$  (1 = no fear/disgust, 7 = extreme fear/disgust).



Both correlations were rather high, however, Erasmus respondents rated the tarantula significantly higher in both emotions (Mann-Whitney fear Z = -2.8823,  $p = 0.0040$ , disgust Z = -2.5620,  $p = 0.0104$ ) and there was a trend for lower scores of the black widow (but not significant).

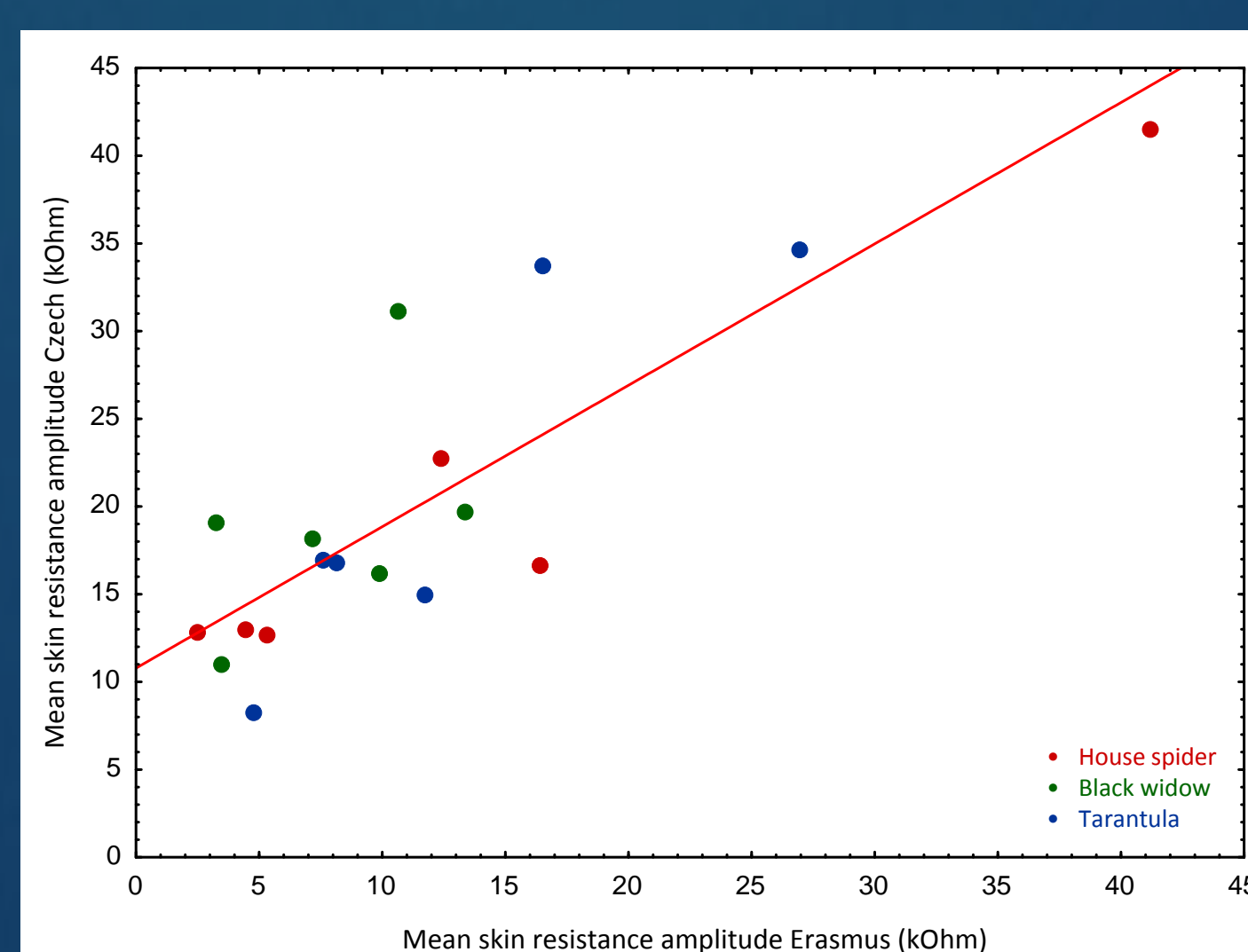


Fig. 7: Correlation of mean amplitudes of the SR response to spider stimuli between Czech and Erasmus respondents:  $R^2 = 0.8544$ ,  $p < 0.0001$ .

## Conclusions

- In both experiments, there seems to be no clear „winner“. The most subjectively fear- and disgust-evoking spider for Czech respondents was a black widow, whereas it was a tarantula in the Erasmus group. But the agreement in the evaluation was quite low.
- This cross-cultural difference might be caused by the recognition of this dangerous spider, which was higher in the Czech group.
- Surprisingly, there was no difference between photos and videos in the self-reported evaluation, while this effect was high in the skin resistance measurement.
- Subjects with higher fear of spiders showed both, higher scores in the evaluation and stronger, longer lasting and more frequent SR reactions.