ON THE AUTOMATIC NATURE OF THREAT

PHYSIOLOGICAL AND PERCEPTUAL RESPONSES TO SUBLIMINAL SURVIVAL-THREATS

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THREAT PROCESSING LITERATURE

Rapid detection and avoidance of imminent danger is a crucial responsibility of the mind.

Neural threat-system evolved that prioritizes the processing of survival threats, both phylogenetic (snakes) & ontogenetic (guns), relative to nonthreatening stimuli (Koller et al., 2019; LeDoux, 1996; Öhman, & Mineka, 2001, 2003)

Threat superiority manifests as earlier detection and faster/stronger responses to threatening than nonthreatening stimuli (Blanchette, 2006; March, Gaertner, & Olson, 2018)

Two problems complicate attributing those effects to an acute threat sensitivity.

THREAT PROCESSING LITERATURE

Problem 1: Threatening stimuli are also negative, but not all negative stimuli are threatening. Without distinguishing threatening from negative stimuli, most studies cannot differentiate sensitivity to threat versus negativity.

March et al. (2017) addressed this problem by comparing responses to supraliminally presented images from four empirically validated stimulus categories: threatening, nonthreatening-negative, positive, and neutral. Relative to the other stimuli, threatening stimuli were detected more quickly, more frequent targets of initial eye-gaze, and elicited stronger startle-eyeblinks.

THREAT PROCESSING LITERATURE

Problem 2: The more challenging problem is that supraliminal presentations do not distinguish whether faster/stronger responses to threat are due to threat superiority effects or the opposing effects of attention and conscious processes evoked by nonthreatening stimuli.

For example, increased attention can delay/diminish responses via slower disengagement and inhibited muscle movement. Faster detection of threat in visual-search tasks might reflect slower disengagement from nonthreatening stimuli (West et al., 2009). Stronger startle-eyeblinks to threat might reflect greater attentional capture, which inhibits blinking, of nonthreatening stimuli (Filion et al. 1998; March et al., 2017).

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THREAT PROCESSING LITERATURE

Problem 2: The more challenging problem is that supraliminal presentations do not distinguish whether faster/stronger responses to threat are due to threat superiority effects or the opposing effects of attention and conscious processes evoked by nonthreatening stimuli.

This problem could be rectified with subliminal presentations of stimuli which prevents conscious perception thereby eliminating the competing effect of conscious processing and isolating the hypothesized effect of threat superiority.

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There are subliminal studies consistent with threat superiority in terms of stronger skin-conductance and startle-eyeblink.

Yet, none distinguish responses to threat from non-threatening-negative stimuli.

- Some assessed responses to threatening stimuli without a critical comparison of responses to negative stimuli (Esteves et al., 1994; Morris et al, 1999; Öhman & Soares, 1998; Ruiz-Padial et al., 2007; etc.)

- Others averaged responses to threatening and negative stimuli (12, Hermans et al., 2003; Lähteenmäki et al., 2015; Reagh & Knight, 2013).

Consequently, those studies do not clarify whether the effects were unique to threat per se or a more general response to negativity.

THREAT PROCESSING LITERATURE

The current research controls for both problems to test whether the mind is uniquely sensitive to survival threats.

Two pilot studies ensured the subliminal nature of the stimuli.

Three within-subject studies subliminally presented validated sets of threating, negative, positive, and neutral stimuli and assessed:

Study 1 (N = 111): skin conductance responses (electrodermal activity)
Study 2 (N = 142): startle-eyeblink (facial electromyography)
Study 3 (N = 83): evaluative inference

If the mind is uniquely sensitive to threat as a functional adaptation for survival, reflexive responses (such as skin conductance and startle-eyeblink) should be stronger to subliminally presented threats than to non-threatening stimuli and such responses should influence downstream judgment (e.g., Bechara & Damasio, 2005).
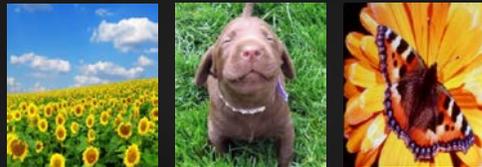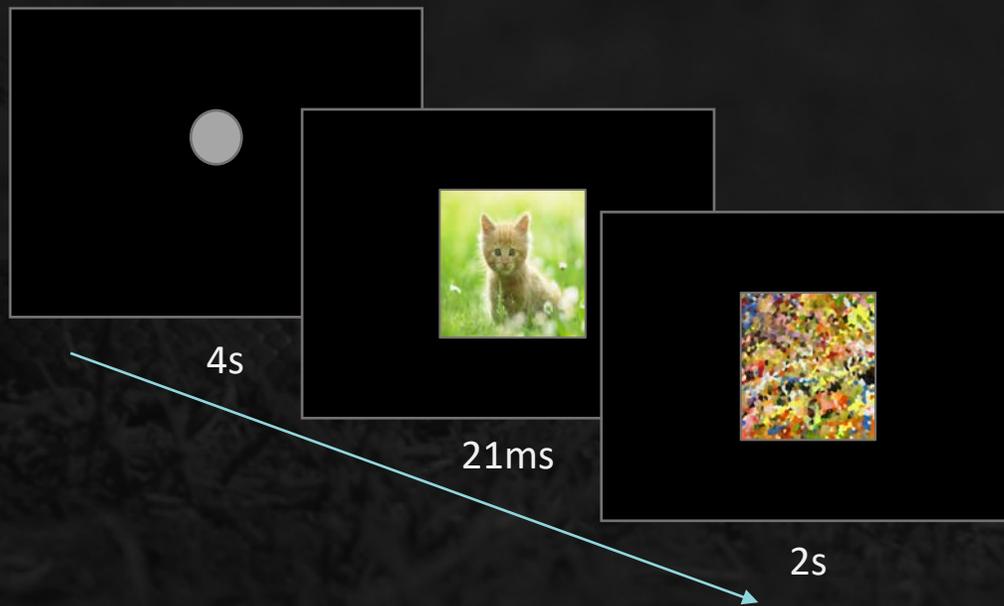
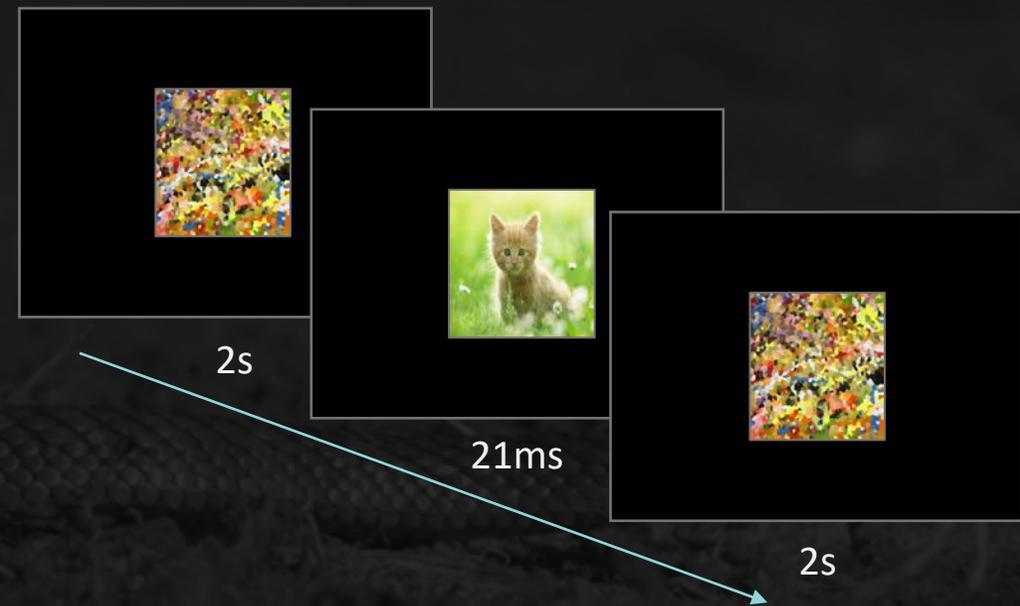2021 SAS

STUDIES 1-3: DESIGN

Neutral

Positive

Negative

Threat

Study 1: SCR

Study 2: fEMG
Study 3: Valence Ratings (1 = bad, 5 = good)

4s

21ms

2s

2s

21ms

2s

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STUDIES 1-3: RESULTS

Study 1

Legend: Threatening · Negative · Neutral · Positive

Y-axis: Skin Conductance Response Amplitude (z-scored)
X-axis: Post-presentation Time (s)
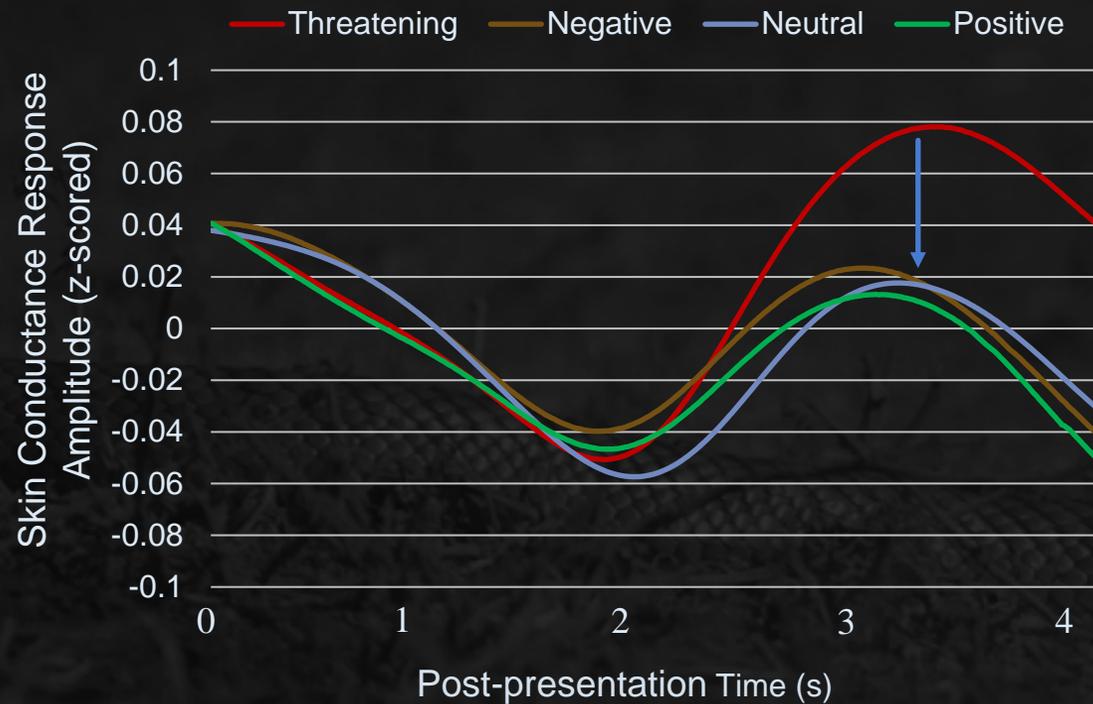
In all three studies, threat differed from the other three, and there was no systematic variability among the latter three.

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CONCLUSION AND IMPLICATIONS

The empirical literature on threat sensitivity suffered two problems: (1) distinguishing threatening stimuli from negative stimuli and (2) differentiating whether responses are sped and strengthened by threat sensitivity or delayed and diminished by conscious attention to nonthreatening stimuli.

I addressed both problems by comparing responses to empirically validated sets of threating, negative, positive, and neutral stimuli, and isolating threat sensitivity from the opposing effect of conscious attention via subliminal presentation.

Consistent with the mind's sensitivity to survival threats, subliminally presented threatening stimuli elicited stronger skin-conductance, startle-eyeblink, and more negative downstream evaluative responses relative to the undifferentiated responses to negative, positive, and neutral stimuli.

The present work makes clear that threat superiority is not a byproduct of conscious attention to non-threatening stimuli and, instead, arises from the mind's sensitivity to survival threats.