

Visual Cues and the Brain

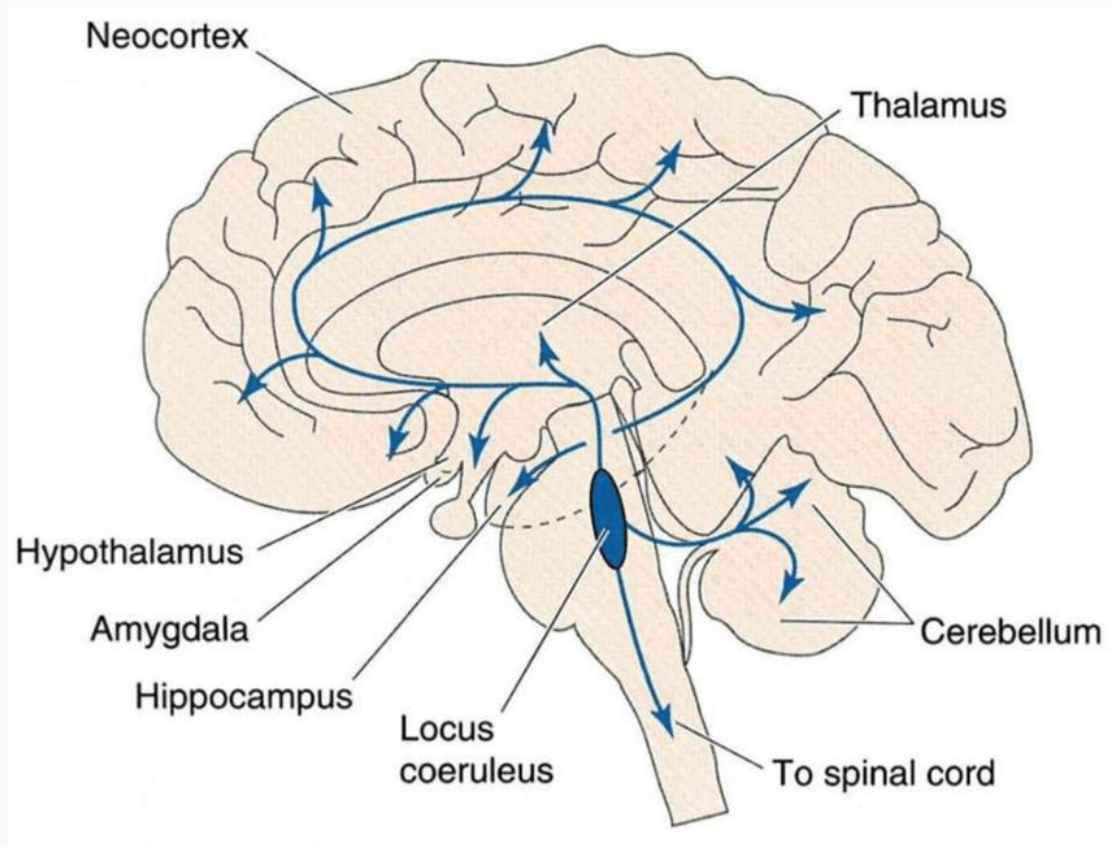
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Eye-Tracking

Introduction

Cognitive functions are presumably modulated by the activation of the locus coeruleus-norepinephrine (LC-NE) system.



Introduction

- Pupil Dilation is known to reflect the LC-NE modulation
- Studies have linked cognitive functions such as attention, memory, processing load, decision making and preference to pupillary responses.

Pupil Dilation: Uncertainty

- LC activity reflects uncertainty about the probability of upcoming events (Yu and Dayan, 2005)
- Pupil signals surprise, that is, errors in judging uncertainty (Preuschoff et al, 2011)

Pupil Dilation: EEG

- Tonic pupil dilation prior to stimulus presentation on an auditory oddball task showed an inverse-U relationship to both the evoked P3 amplitude and to task performance (Murphy et al., 2011)
- However, direct correlation yet to be established

Pupil Dilation: Memory

When pupil dilation peak was reached predicted a child's or adult's STM capacity (Johnson et al., 2014)

Other Points to Consider...

The temporal relation between LC discharge and NA release to the pupillary response

Pupil Dilation for both Japanese word that fits and that doesn't?

Spontaneous eye blinks as a modality

Micro-Expressions

Introduction

- First found by Haggard and Isaacs in 1966
- Usually occur in high-stake situations where people would have serious consequences if they were caught lying or cheating
- They may be fragments of a squelched, neutralized, or masked display (Ekman & Friesen, 1969)



Micro-Expressions: Emotion

Cacioppo et al. (1992) related micro-expressions to affective stimuli

Yan et al. (2013, 2014) used video episodes rated as happy and sad to elicit micro-expressions

Micro-Expressions: Duration

- 166.7ms - 502ms; Yan et al, 2013
- Theoretical lower limit between 100ms - 166.7ms

Micro-Expressions: Datasets

- Datasets for spontaneous micro-expressions:

CASME II (200 fps); SMIC (100 fps); SAMM (200 fps)

Micro-Expressions: Detection vs Recognition

Detection: To spot the occurrence of a micro-expression

Recognition: To identify the micro-expression class (happy, sad..)

Micro-Expressions: Recognition

Present accuracy:

Using all frames (Wang et al., 2015): 66.46%

Using reduced framerate (Liong et al., 2018): 0.62 (SMIC HS), 0.58 (SMIC VIS)

Other Points to Consider...

- No studies linking oddballs/ semantic incongruence to micro-expressions; strength of stimuli?
- Lack of code implementations

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