Mock crime application of the concealed information test using fNIRS combined with SCR, HR and RT

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Abstract

To explore the forensic application of neuroimaging-based concealed information test (CIT) with combined multiple measurements, the simultaneously recorded data of functional near-infrared spectroscopy (fNIRS), skin conductance responses (SCRs), heart rate (HR), and reaction time (RT) is collected in order to detect participants' concealed information in a standard CIT with a mock crime scenario. We hypothesized the fNIRS-based neuroimaging data could successfully detect deception, and the combination of multiple indicators could integrate multidimensional information triggered by deception, thus providing enhanced efficiency in deception detection. The results validated the hypotheses that fNIRS-based neuroimaging data could effectively discriminate between guilty and innocent participants after a mock crime. Furthermore, the use of multiple indicators resulted in a much higher detection efficiency (AUC = 0.96 with fNIRS channel 8) compared to the use of a single indicator (AUC = 0.66-0.86). These results illustrate the potential of the combination of fNIRS and multiple indicators for deception detection with a mock crime scenario and further facilitate the forensic application of fNIRS-based CIT.

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(a)

(b)

(c)

Guilty group

Innocent group

Guilty group

Innocent group

Probe   **Irrelevant**

0μM   0.32μM