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Neural bases of decision-making in online poker gambling

What this research is about

Online poker gambling (OPG) is a popular gambling activity. People who play poker must make decisions even when they feel strong emotions or uncertainty. The Iowa Gambling Task (IGT) evaluates decision-making ability under conditions of uncertainty. The task involves choosing between four decks of cards. People with gambling disorder show altered performance in this task.

Some studies have used electroencephalography (EEG) to assess event-related potentials (ERPs), which show how quickly neurons are activated in response to reward and punishment. This study examined the neural bases of decision-making among people who play OPG and those who do not gamble. It explored whether changes to neural activity could be induced by regular practice in online poker, even without gambling disorder.

What the researchers did

The researchers recruited 42 adult male volunteers through local press release in Besançon, France. Both people who played OPG and those who did not gamble were recruited. Participants must not have any neurological or psychiatric disorders (current or past). On average, participants were 26 years old.

The researchers divided the participants into two groups. One group included 20 participants who did not gamble ('NG' group). The other group included 22 participants who played OPG ('OPG' group) but did not have gambling disorder. This was assessed using the DSM-5 criteria. Participants completed several questionnaires before the IGT, including the following:

- Montgomery and Åsberg Depression Rating Scale.
- Canadian Problem Gambler Index (CPGI), where scores of 3+ indicated at-risk gambling behaviour and scores of 8+ indicated excessive gambling.
- Alcohol Use Disorder Identification Test.
- Fagerström Test (to assess nicotine dependence).
- DSM-IV-TR Substance-Dependence Adapted Scale (to screen for video gaming disorder).
- Barratt Impulsiveness Scale.
- Chapman Anhedonia Scale (to assess ability to experience pleasure in various domains).
- Snaith-Hamilton Pleasure Scale.

What you need to know

The purpose of this study was to examine the neural bases of decision-making involved in online poker gambling (OPG). A total of 42 adult male volunteers were recruited. Twenty-two participants played online poker ('OPG' group), while the rest did not gamble at all ('NG' group). They completed the electronic version of the Iowa Gambling Task (IGT). Electroencephalography (EEG) signals were recorded during the IGT. EEG was used to assess event-related potentials (ERPs), which show how quickly neurons are activated in response to reward and punishment. Both groups showed a learning effect on the IGT. But the NG group learned and adopted a more favourable strategy quicker than the OPG group. Both groups showed ERPs for wins about 150–175 ms after receiving the reward. These ERPs were generated by the temporal and parietal lobes. The NG group showed additional neuronal activity in the occipital region. This study suggests that the OPG group may not show this additional processing because they are used to virtual environments.

- Behavioural Inhibition System and 'Behavioural Approach System (BIS/BAS; to assess behavioural responses to rewarding and aversive situations).

Participants completed the electronic version of the IGT. Two decks were 'disadvantageous' decks (i.e., provided immediate rewards but led to major losses in the long term) and two were 'advantageous' decks (i.e., provided small, but frequent, wins and smaller long-term penalties, leading to long-term gain). Each deck contained 200 cards. There were 10 blocks of 20 trials. EEG signals were recorded during the IGT.

What the researchers found

The researchers found that the OPG group had a higher level of physical anhedonia and BAS-Drive than the NG group. This means that the OPG group showed a reduced ability to experience pleasure in daily life along with greater motivation to pursue goals. This could motivate their gambling behaviour. On average, the OPG group scored 3 on the CPGI. Five participants scored higher than 7, indicating excessive gambling.

The OPG group did not show better performance than the NG group on the IGT. The NG group learned and adopted a more favourable strategy quicker than the OPG group. Both groups showed a learning effect: they improved between the first and last blocks of the task. In the NG group, the difference was seen between the first three blocks and the last five blocks. In the OPG group, the difference was seen between the first and the last three blocks.

Both groups showed early outcome processing. ERPs were produced by the brain for wins about 150–175 ms after receiving the reward. These ERPs were generated by the temporal and parietal lobes. The temporal lobe is associated with learning visual material. The parietal lobe is associated with working memory and attention. The NG group showed additional neuronal activity between 215 and 295 ms after the outcome in the occipital region of the brain. This reflected additional processing of visual information. The researchers suggested that the OPG group may not show this additional processing because they are used to virtual environments.

How you can use this research

This study can inform gambling research. Future research can clarify the impact of online activities on neural activity among those who play online poker.

About the researchers

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