Validation of a stimulus set

Images are everywhere in everyday lives. They cannot be unseen but are noticed unconsciously most of the times. Especially advertisements are placed in a way to influence the consumers without their notice. These unconscious stimuli are used to affect behaviors (quelle). In the gambling industry certain images are placed in casinos, in arcades and gambling halls in order to create a specific atmosphere and, unknown to the players, rise the gambling activities, make people spend more money and gamble more often. (quelle).

Studies about the sensitivity of the brain to gambling associated stimuli in pathological gamblers show that when looking at gambling relevant images, certain brain areas like the dorsolateral prefrontal and anterior cingulate cortex and parts of the striatum, responsible for the reward system, are especially sensitive. (Crockford et al., 2005; Goudriaan et al., 2010; Potenza et al., 2003; Van Holst et al., 2012a). Most studies report low sensitivity for rewards in pathological gamblers (Balodis et al., 2012; Reuter et al., 2005; Romanczuk-Seiferth et al., 2015; De Ruiter et al., 2009).

Cue reactivity plays a very important role in the development and maintenance of additions, but it is necessary to identify the images factors that trigger decisions in the gamble and are responsible for cue reactivity (…). To improve prevention and consulting services especially regarding programs and advertisements, the impact of used stimuli needs to be analyzed.

Question is if there is a differential effect of different stimuli categories used in materials for aid offers, if pictures representing the gambling category are more likely to rise the temptation of gambling instead of helping. Goal of this study therefore is to understand and evaluate the effect of gambling associated as well as emotional images on subjective, psycho-physiological and neural levels in gamblers and healthy controls. Emotions are known to influence behaviors and let people react according to them.

With these findings, materials can hopefully be adjusted to the clients to prevent pathological addictions and relapses in already addicted gamblers. Furthermore, interactions between different image categories and decision-making processes and lost aversion should be examined.

In this study, a stimulus set of a variety of images including gambling images (own set), positive and negative images as well as neutral images (IAPS) is validated in order to find out if the chosen images represent the respective category (gambling, positive effects of abstinence of gambling, negative effects of gambling and neutral) and how much each category of images induce craving for gambling. Ratings of arousal, valence and dominance for each picture are collected too.

Physio and fmri:

To verify that background pictures do have an impact of the gambling behavior. Loss aversion task with different stimuli in the background.

Hypothesen vppg

It was hypothesized that the picture in the background influences the choice of willingness to accept the gamble.

Results showed, that pathological gamblers increased gambling (accept/rather accept a trail) in trails when gambling-associated images were presented in the background in comparison to healthy controls.

In order to explain the results from the mixed gambles in the LA x affect task, we need to analyze the ratings of the displayed pictures in the background of each gamble and to make sure that the chosen pictures represent the respective category and induce specific emotions. The following analyzes refer to the pre-studies that were scheduled for this purpose.

The pre-studies worked with the image categories “gambling images”, “images showing negative effects of gambling (negative)” and “images showing positive effects of abstinence from gambling (positive)”. In the actual study, neutral images (from the IAPS) were presented additionally.

Study 1: Evaluation of images

Goals: it is known that specific pictures induce specific emotions. Proven for a variety of pictures (IAPS).

Now: Want to know if the pictures of TOPIC GAMBLING induce emotions in a way that influences gambling behavior. In comparison PG and HC.

The pre-studies before conducting an fMRI experiment were completed in order to analyze the associations people make with certain picture. Rating the images on the dimension of arousal (relaxed to excited), dominance (low to high) and valence (unhappy to happy) to look at the induced emotion itself, and additionally asking questions about the pictures representing GAMBLING TOPIC.

find out which image category lead to which kind of emotion

Methods

Image collection

Neutral images were chosen from the IAPS database and the NAPS. The gambling related images were collected prior to the experiments through the internet. Additionally, pictures of flyers and therapeutic institutions were gathered and gambling addicted patients were asked for their personal ideas about pictures that represent the respective category. In the process, the stimuli of neutral images and the gambling related images were matched so that the groups had similar number of images featuring people in general and specifically faces, as well as try to get similar number of images featuring men, women and children.

Subjects

In five different partial pre studies a total of n=40 participants completed the evaluation of the image data. For the technical check 3 people were recruited (HC, age mean=28 (SD=4,4), 2 females), 13 subjects took part in the pre test online-rating (HC, mean age= 22,7 (SD=2,4), 11 females), first online-rating was completed by 21 participants (HC, mean age=30,3 (SD=7,6), 17 females), second online-rating was completed by 7 participants (HC, mean age=24,3 (SD=3), 5 females) and 16 pathological gamblers completed the PG online rating (PG, mean age=38,4 (SD=12), 5 female).

Procedure

In each PS, subjects were asked to rate each presented image using the SAM (Self-Assessment-Manikin) on the computer, regarding the valence, arousal and dominance the shown image induces in them individually. Furthermore, five image rating questions were asked specifically about the association of each picture with (1) craving for gambling, (2) gambling, (3) negative effects of gambling, (4) positive effects of non-gambling and (5) how much the picture motivates the subject to question their gambling behavior (not in PS 1). Question 5 was only asked if the subject answered “yes” to one of the Lie/Bet-Questions (Johnson, Hammer, Nora., Tan, Eistenstein, & Englehart 1988).

The first partial study (PS) (n=3) was conducted as a cognitive interview in order to get oral feedback on the format of the questionnaire, identify potential ambiguities and problems in questions and stimuli, and ensure that the instructions are clear. The experiment was also checked for possible effects on the rating depending on the presented sequence of the images and for stimuli outliners.

The goal of the second PS (n=13) was to gather ratings data to establish a smaller and reliable sets of gambling, positive, negative and neutral pictures and check for the possible effects of order of the rating pictures on the ratings (rating drift effects) again. The participants conducted an online questionnaire in which the images were presented.

Results

The feedback helped improve the questions and the instructions, as well as the format of the ratings. No conclusive evidence was found that image order makes a strong impact on the ratings. A few stimuli outliers were identified and replaced, angles of images were adjusted.

Out of all collected images, 24 neutral images, 67 gambling images, 31 positive and 31 negative images were chosen for the final experiments (physio and fmri).

Study 2: Peripheral physiological measurements

Methods

Subjects

For the peripheral physiological measurements 64 participants were recruited and screened regarding exclusion criteria. 54 were included in the studies. 27 of the participants conducted the first peripheral physiological experiment (HC, mean age= 28,5 (SD=7,4), 18 females). 11 participants conducted the peripheral physiological control measurement. (HC, mean age= 24,0 (SD (3), 9 females) and 16 pathological gamblers completed the measurement (PG, mean age= 38,4 (SD=12) 5 females). In the final analysis the data of 24 healthy controls (HC, mean age = 28 (SD=8), 19 females) and 16 pathological gamblers (PG, mean age= 39(SD=12, 5 females) were evaluated.

Procedure

PTD task and EDA (…), corrugator(…) and zygomaticus(…) data were gathered, followed by the most basic demographic questions.

In this study, the physiological measurement was included in order to investigate whether the stimuli (of certain groups) yield differential physiological responses (the PDT task), to test the hypothesis related to stimulus modulation of risk aversion (choose the option with the least risk) and to prepare the images for the following experiments.

Participants performed a PDT task, where a loss aversion task with mixed gambles (LA x affect task) was performed, in which gambling cues as well as other emotional stimuli were presented in the background. The task was to accept, rather accept, rather not accept or not accept a money gamble with 50/50 chance of winning or losing. To secure that subjects pay attention to the pictures as well as the gamble, a paid recognition task for the images was introduced beforehand and conducted afterwards. (for further information about the PDT task see Alex’ study). After the recognition task, each picture was rated in the categories arousal, valence and dominance using the Self-Assessment Manikin (SAM). Pictures were also evaluated regarding the representativeness of gambling itself, negative effects of gambling, positive effects of the abstinence from gambling and induced craving for gambling.

The same pictures as in the third PS were used.

The questions in the rating were the following:

Image Rating 1 - Wie stark löst dieses Bild bei Ihnen das Verlangen nach Glücksspiel aus?

Image Rating 2 - Wie passend stellt dieses Bild ein oder mehrere Glücksspiele dar?

Image Rating 3 - Wie passend stellt dieses Bild mögliche negative Folgen von Glücksspiel dar?

Image Rating 4 - Wie passend stellt dieses Bild mögliche positive Folgen des Verzichts auf Glücksspiel dar?

Image Rating 5 - Wie stark motiviert Sie dieses Bild Ihren Glücksspielkonsum zu hinterfragen? (This question appeared only if Lie-Bet question was answered positively)

Study 3: experimental fMRI study

Methods

Subjects

Subjects were recruited via social media, the intranet and leaflets in different regions all over Berlin.

Results

* Rating data was analyzed together with the data of 13 Pretest subjects who completed their questionnaire online, as well a+s Pretest02 and Pretest03 for images that were the same (neutral category pictures were different).

Criteria for the adequacy of pictures were defined for each group and mathematically formulated: the criterion for neutral images was the most neutral ratings on valence, dominance and arousal; the criterion for positive and negative images was based on valence, as well as the ratings 3 and 4 respectively; the criterion for gambling images was based on rating 2.

Top 40 gambling, 20 positive, 20 negative and 40 neutral images were selected. More on this can be found in a report at: VPPG\_Exchange/Experimente/PDT/analysis/scripts/R/image\_adequacy/image\_adequacy\_Report.html

* The neutral group of pictures had ratings on arousal that were medium, and had produced similar levels of physiological response like other categories. This is why we decided to use André Weinreich’s IAPS stimuli instead of the ones we selected
* The drift effects on ratings were overall very small, but certain ratings were more malleable than others: arousal was influenced the most, which followed by dominance and valence. Also there were stark differences across participants. More on this can be found at:

VPPG\_Exchange\Experimente\PDT\analysis\scripts\R\plot\_bilderratings\Bilderrating\_Drift\_Report.docx

Physiological data acquisition. Introduction for patients? Any other tasks?

Stimuli Validation

Table with every single picture in the columns bytes, luminance, pixel, contrast, , aspect ratio,

Physio-postpilot only:

Arousal

As expected, image category affected arousal ratings (ΔChi2 = 425, Δdf = 7, p < 0.001, where gambling images (β = -0.346, p =0.017) were rated as lower than 0 in arousal. Negative images were slightly more arousing than 0, but not significantly (β = 0.077, p = 0.584).

Dominance

As expected, image category affected dominance ratings (ΔChi2 = 631, Δdf =7, p <0.001), where the positive images were rated higher than 0 (β =0.854, p < 0.001). Negative images were rated as lower than 0 in dominance (β = -0.468, p= 0.004). The ratings for gambling images did not significantly differ from 0.

Valence ratings

As expected, image category affected valence ratings (ΔChi2 = 413, Δdf = 7, p < 0.001), where the positive category was rated higher in valence than 0 (β = 1.205, p < 0.001). Negative images were rated as lower than 0 in valence (β = -1.070, p < 0.001), Gambling pictures were not rated significantly different from 0.

Representativeness for gambling

As expected, image category affected gambling representativeness ratings (ΔChi2 = 278, Δdf = 7, p < 0.001), where all image categories were rated higher than 0. Gambling pictures were rated highest (β= 1.986, p< 0.001). Gambling images were more representative of gambling than any other category: gambling>negative (β = 1.042, p < 0,001), gambling>positive (β = 1.422, p < 0.001).

Craving inducing

As expected, image category affected craving ratings (ΔChi2= 419, Δdf =7, p < 0.001). Gambling pictures induced more craving for gambling than any other image category: gambling>0 (β= 0.436, p < 0.001), gambling>negative (β = 0.248, p < 0.001), gambling>positive (β = 0.216, p < 0.001).

Representativeness for negative effects of gambling

As expected, image category affected ratings of representativeness for negative effects of gambling (ΔChi2 = 373, Δdf = 7, p < 0.001), where negative image category were rated highest (β = 2.357, p < 0.001). Negative image category was more representative of negative effects of gambling than any other group: negative > gambling (β = 1.457, p < 0.001), negative > positive (β = 2.095, p < 0.001).

Representativeness for positive effects of gambling abstinence

As expected, image category affected ratings of representativeness for positive effects of gambling abstinence (ΔChi2 = 1009, Δdf = 7, p < 0.001), where all categories where rated higher than 0, with positive image category ranking highest (β = 1.943, p < 0.001). The positive category was more representative of positive effects of abstinence from gambling than any other category: positive > negative (β = 1.620, p < 0.001) and positive > gambling (β = 1.443, p < 0.001).

DISCUSSION

The results in the pre-study allow to draw the conclusion, that the chosen pictures are representative for the respective category. Emotional performance was influenced by different categories, whereby the positive image category let to higher ratings in valence and dominance, the gambling image category increased the arousal rating.

It was important to assure that the evaluation coincide with image category in order to later draw correlations between image category and behavioral gambling data.

Pathological gamblers rate the gambling images as high arousing, which lead to the assumption, that gambling associated images aren’t only arousing but also rise the temptation for gambling. This image category is rated as more positive by the PGs in comparison to HC.

All subjects were influenced in an affective way by each category in the intended direction.

Group effects could also be detected in the positive image category. PGs rated pictures that represent positive effect of non-gambling, as less positive than HC. PGs felt less dominant when looking at positive images compared to HC.

PGs rated negative images (negative effect of gambling) as less negative as HCs. This indicates a strong bias of the emotional processing of PG which leads to an adverse constellation regarding the risk assessment or abstinence of gambling.

Conclusion:

Negative images and gambling images presented in advertisement are tempting the desire for gambling (craving) in pathological gamblers. When showing this image category on materials for intervention and therapy programs, there would be a danger to evoke the contrary of the desired effect.

With the help of the study it was possible to create a consistent stimulus set which includes gambling pictures (next to the IAPS set) which can be used in further studies concerning gambling. It is now known with category of pictures induce which emotions in which intensity, comparing gamblers and healthy controls.

The overview of the particular images shows the features of the picture, in terms of image resolution, ratings and representativeness for the selected categories, for pathological gamblers and healthy controls in a table. With this table it is possible to track which images were used in which partial study.

FUNDING AND DISCLOSURE

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REFERENCES

References

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