

Scientific and Technical REPORT

„How does the blue sky become grey? Examining the sensitivity of neurotics for processing the negative stimuli in evaluative conditioning”

AFFLEARN - PN-III-P4-ID-PCE-2020-1964
(January 2021 – December 2021)

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Scientific and technical report for the AFFLEARN project (PN-III-P4-ID-PCE-2020-1964)

I. General description of the project

Funding Program and Institution:	Fundamental and frontier research, CNCS – UEFISCDI
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II. General and specific objectives for the AFFLEARN project

1. General objective

In this project, we will focus on how neuroticism shapes learning in an evaluative conditioning paradigm. Previous research on neuroticism and stimuli processing, concluded in a fundamental theoretical perspective that describes neurotic people to be generally focused on the negative stimuli (e.g., Eysenck, 1967; Gray, 1981). However, this "traditional" approach to high neuroticism manifestations has become questionable due to a recent outcome demonstrated through the EC effect. Vogel et al. (2019) showed that highly neurotic individuals present a substantial EC effect on both the positive and the negative conditions compared to low neurotic people, indicating that neurotic individuals pay more attention to the valence feature when processing an object. Given the equivocal results, more studies need to be carried out in order to support one of the two perspectives.

Hence, the primary purpose of the current project is to examine highly neurotic individuals' sensitivity towards negative stimuli processing in an evaluative conditioning paradigm. To accomplish this objective, we will implement three experimental studies.

01. Testing whether neuroticism impacts the evaluative conditioning effect in a design that includes ambivalent USs and classical positive and negative USs.

The first study's objective is to test whether neuroticism impacts the evaluative conditioning effect in a design that includes ambivalent USs and classical positive and negative USs. This research design represents an originality element in the literature. By introducing this novelty element, we intend to clarify to what extent high neurotic people tend to focus on negative aspects. To be more specific, in the evaluative conditioning design, we will simultaneously pair the CSs with a mixed image that contains both positive and negative USs. More details about the hypotheses and design are presented in the *Activity 2*. We expected to gather support for the negativity bias hypothesis, and therefore to clarify the specific perspective that can be used to explain this learning process for highly neurotic individuals. In our initiative, we also relied on data gathered from a feasibility study that was previously conducted. In that study, the results supported our hypothesis.

02. Investigating the potential cognitive mechanisms responsible for the evaluative conditioning effect, by building upon the expected results of the first study.

Building on the findings expected for the first study, the second study's objective is to underline the potential cognitive mechanisms that may be responsible for the evaluative conditioning effect. More clearly, our aim is to investigate why and how neuroticism impacts the manner in which people attach a specific valence to the newly encountered objects.

For instance, we will take into account the attentional bias in order to verify if individuals scoring high on neuroticism spend more time processing the negative features of the ambiguous stimulus, as captured by an eye-tracking device.

We also intend to investigate an affect bias, based on the assumption that people scoring high on neuroticism tend to appraise the CS stimuli that were paired with ambiguous USs as less pleasant, because, in the absence of definitive clue about how to see the ambiguous US, they will rely on affect as information. This will imply judging the stimuli in congruence with the mood (supposedly more negative) or negatively interpreting the task (situation) as demanding or stressful.

A memory bias will also be considered as a viable explanation. This suggests that highly neurotic individuals might manifest a negativity biased recall. For instance, they will misattribute how the CSs were paired (both with positive and negative images), recalling that they were paired only with negative USs.

Each of these mechanisms (attention, affect, situation, and memory) will be sequentially introduced in the design in order to investigate how they interact and which of them explains the most variance in the observed effect.

03. Testing the generalizability of this negative bias effect based on the evaluative conditioning procedure in a direction that is also relevant for seeing neuroticism as a risk factor for emotional disorders.

The flexibility of the EC procedure allows us to test hypotheses that exceed the fundamental question of whether people high in neuroticism tend to focus more strongly on valenced stimuli in general or only on negative stimuli.

Hence, the third objective of this project is to test the generalizability of the negative bias effect based on the evaluative conditioning procedure in a direction that is also relevant for the vulnerability account, while portraying neuroticism as a risk factor for emotional disorders.

In our approach, we will rely on a recent theoretical contribution of our partners from the Twinning grant (De Houwer et al., 2019). This conceptual framework creates common ground between similar phenomena that usually are studied in isolation, such as evaluative conditioning, attribute conditioning, spontaneous trait inference and the halo effect. Being placed at the confluence of social psychology and learning psychology, this framework manages to reduce the fragmentation caused by using different terms that describe similar learning mechanisms.

They pointed out an untested assumption that evaluative conditioning procedures could lead to changes in liking and changes in the perception of other stimulus features (e.g., a neutral CS is perceived as more intelligent and trustworthy after being paired with the positive US). Examining changes in beliefs about the features of stimuli (e.g., whether a person is intelligent or aggressive) is also interesting from a clinical perspective.

According to mainstream theories on psychopathology (Beck, 1976), maladaptive reactions (e.g., depression) do not result from an adverse event but from the way people interpret such an event. Inferences like these share an uncertainty feature.

We are talking about assumptions people make, not about proven facts. Therefore, we expect that propositions that emerge during or after the evaluative conditioning phase are highly relevant to examine the link between neuroticism and negative inferences as a source for the emergence of vulnerability.

2. Conclusion

To conclude this point, all three studies contain significant elements of originality in the context of the current state of the art in the field. The first study will provide evidence in favour of a learning negativity bias in people scoring high on neuroticism by appealing to ambiguous stimuli (situations). The second study will provide clues on the cognitive mechanisms that are responsible for the effect. The third study will address whether the bias in the valence appraisal will also relate to the way people perceive the object of the appraisal on other features.

Hence, these studies will help getting a whole picture by providing an explanatory mechanism of why emotionally vulnerable people are considered at risk for mental health issues.

III. Scientific and technical report in extenso

1. Specific objectives for this phase

This year we addressed the first objective. Hence, we will provide all the descriptive details on method aspects and procedure on each study, with more emphasis put on the second study.

Objective 1: The primary objective of this phase was to investigate whether neuroticism impacts the evaluative conditioning effect in a design that includes ambivalent USs and classical positive and negative USs.

Degree of accomplishment: 100%, this objective was entirely reached.

2. Planned results for this phase

For this phase, we planned to disseminate the conclusions resulted from the first objective in a scientific article that is submitted, accepted, or published in a Web of Science Journal.

3. The summary of the current phase

To accomplish the first objective, we carried out 2 activities, all related to the investigation of the Neuroticism role on evaluative conditioning effect, while introducing ambivalent stimuli in the conditioning procedure.

The first activity consisted in setting up the design of the study in detail and implementing the study (see its results in the technical description, and the database available at OSF). The second activity consisted in analysing, reporting the results, and writing the manuscript (see results in the technical description, as well as in the dissemination section).

4. Scientific and technical description

Activity 1 (January 2021 – June 2021)

Setting up the design of the study in detail and implementing the study.

Study design

In the first experiment, the conditioning procedure involved a 4 (US valence: positive vs. negative vs. neutral vs. ambivalent) within-subjects design. The conditioning procedure from the second experiment involved a 3 (US valence reinforcement: 100% Negative vs. 100% Positive vs. 50% Negative – 50% Positive) within-subjects design.

Participants

In the first experiment, participants (N = 556; 364 female, 192 male, Mage = 24.42, SD = 7.38) were students from West University of Timișoara. They received course credit in exchange for their participation in the study. For the second experiment, the participants (N = 306; 234 female, 72 male, Mage = 24.08, SD = 7.66) were also students from the West University of Timișoara who received course credit in exchange for their participation.

Materials

In Experiment 1, the 48-item Neuroticism scale from the NEO PI-R (Costa & McCrae, 1992) was used to get scores both for the personality dimension and the six facets involved. For the conditioning task, the CSs were represented by eight computer-generated grayscale fractals. All of them were used in other evaluative conditioning studies (e.g., Sava et al., 2020), thus their valence acquisition property was validated. USs consisted in eight pictorial stimuli (two for each valence) constructed as in Glaser et al. (2018) (i.e., each US contained two pictures of the same valence or different valences within one picture). The stimuli used in USs' construction were selected from the International Affective Picture System (IAPS; Lang et al., 2008).

For Experiment 2, we used the 48-item Neuroticism scale from the NEO PI-R (Costa & McCrae, 1992) as in Experiment 1. The 12-item Negative Emotionality scale from Big Five Inventory-2 (BFI-2; Soto & John, 2017) was used as an alternative for neuroticism measurement, being part of a psychological personality instrument based on the Big Five Theory. The Negative Emotionality was measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Scores for the 3-related facets were computed (Anxiety, Depression, and Emotional Volatility). Behavioral Inhibition System (BIS) was measured by using a 7-item scale from BIS/BAS scales (Carver & White, 1994). The responses were recorded in a Likert format from 1 (strong disagreement) to 4 (strong agreement). The 19-item Neuroticism-Anxiety scale from the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ; Zuckerman, 2002) was used to assess neuroticism dimension from a psychobiological perspective. A dichotomic scale (True/ False) was used for response recording. The 100-item Emotionality factor from HEXACO (Lee & Ashton, 2018) was used as an alternative measurement of the Five Factor (low) Emotional Stability/ (high) Neuroticism on a 5-Likert scale (1 = strongly disagree to 5 = strongly agree). Supplementary, 10 Emotionality Adjectives from HEXACO model were used to assess the Emotionality State as a construct related to low neuroticism state (Ashton et al., 2004). The adjectives were translated from the Italian version (Ashton et al., 2004). The responses were recorded on a Likert scale ranging from 1 (not describe me at all) to 5 (totally describes me). The 10-item Negative Affect Scale from PANAS (Watson et al., 1988) was used as a self-report measure of negative affect mood on a 5-point Likert scale (1 = very slightly to 5 =

extremely). The descriptive statistics for all of the instruments are provided in the Supplemental Materials on OSF (osf.io/xhrj4).

For the second experiment, six fractals from Experiment 1 were used as CSs. Eight pictures selected from IAPS (Lang et al., 2008) were used as USs. Four of them were positive and four were negative. All of the USs had, as a main representation, a human or a child face which expresses a positive or a negative state.

Procedure

In the first experiment, when the participants entered the lab, they were welcomed by a research assistant and seated in front of a computer. As in Experiment 1, all of the materials were provided by clicking a link via Inquisit 5. But given the Pandemic context, Experiment 2 was carried out during online meetings by using the Google Meet tool from the Google suite, and not in a lab setting. An online meeting involved almost 15 participants. The link for the meeting was provided after participants completed a participation form which required the date and time when they would be available for the study participation. At the start of the meeting, participants were informed to keep their web camera on until they submit their responses and to access the Inquisit link provided in chat for starting the study. Once they clicked the link, all the materials were presented on their computer screen via Inquisit 5 Lab program. Before being immersed in the study, the participants were informed and trained how to install Inquisit 5.

First, the participants read the consent form presented on the screen. By pressing the “Space” bar, they gave their agreement with regard to study participation. Further, they filled in the demographics research part (e.g., age). Next, the self-report instruments were provided. Firstly, participants had to complete the Emotionality Adjectives from HEXACO reporting their responses at the last hour. Then, PANAS Negative Affect required responses regarding the state negative affect at the time of completion. Trait measurements were provided after in the following order: Neuroticism scale from NEO PI-R, Negative Emotionality scale from BFI-2, BIS items, Emotionality scale from HEXACO, and Neuroticism-Anxiety from ZKPQ.

The EC experimental procedure started immediately after a practice stage. After the EC procedure ended, participants were asked to evaluate how much they liked or disliked the fractals (CSs). Each CS was evaluated on a scale that ranges from -3 (*very unpleasant*) to +3 (*very pleasant*). Other two dependent variables were included as exploratory outcomes: *Expectancy* and *Thinking of*. For the Expectancy measurement two questions were provided: (1) *To what extent do you expect the computer-generated picture will appear simultaneously in the following seconds with a PLEASANT image?* and (2) *To what extent do you expect the computer-generated picture will appear simultaneously in the following seconds with a UNPLEASANT image?*

Both questions were rated on a scale from 0% to 100%. Each question was presented below each CS, but following one after another for the same CS. The order of the questions for the same CS (rating for PLEASANT or UNPLEASANT) was randomized from a participant to other. The Thinking of outcome was measured using the same procedure, but the two questions were different: (1) *To what extent does this computer-generated picture make you think of a PLEASANT aspect?* and (2) *To what extent does this computer-generated picture make you think of a UNPLEASANT aspect?*

Immediately after, participants had to identify with what kind of US was paired with each CS (i.e., valence awareness). Similarly, each CS was presented on the screen to be assigned with one of the following options: *Pleasant pictures*, *Unpleasant pictures*, *Both with pleasant and unpleasant photos*, or *I don't remember*. Finally, participants had to give a short explanation regarding why they considered that a computer-generated image was always presented with a real-life picture. At the end of the experiment, participants were thanked, debriefed, and compensated.

Activity 2 (July 2021 – December 2021)

Analysing, reporting the results, and writing the manuscript.

Results

We tested whether neuroticism impacts the evaluative conditioning effect in a design that includes ambivalent USs in two separate studies. Both studies were funded by LEARNVUL No. 952464 - H2020-WIDESPREAD-2020-5 Twinning, and also funded by the present project.

In the first experiment, the results showed the CSs paired with ambivalent USs are mostly evaluated in a negative direction as a function of neuroticism. Specifically, the higher the neuroticism from study population is, the more negatively CSs paired with ambivalent USs become.

During the second study, the ambiguity was manipulated through reinforcement: 50% positive reinforcement and 50% negative reinforcement. Supplementary to the previous study, the neuroticism was measured by using a variety of scales which operationalize this personality trait in accord to the Big Five Theory and other personality perspectives in defining neuroticism. All measures proved a general decrease in the overall evaluations of the CSs, independent of the USs; valences which were paired with.

Regarding the CSs paired in 50% of presentations with positive USs and in 50% of presentations with negative USs, the results showed a negative direction in evaluation as an increased trend of neuroticism in the study population.

5. Dissemination

The activities and the conclusions resulted from the first objective are disseminated in two scientific articles, one manuscript waiting for final adjustments to be submitted by the end of this year, and one accepted publication.

Both manuscripts acknowledge the support of the current grant.

Bunghez, C., Sava, F.A., Rusu, A., De Houwer, J., Perugini, M., & Boddez, Y. (manuscript in preparation). *The Moderating Role of Neuroticism on Evaluative Conditioning Effect: Ambivalence and Reinforcement Manipulation* (to be submitted)

Isbășoiu, A.B., Tulbure, B.T., Rusu, A., & Sava, F.A. (2021). Can we boost treatment adherence to an online transdiagnostic intervention by adding self-enhancement strategies? Results from a randomized controlled non-inferiority trial. *Frontiers in Psychology, 12*, 752249. doi: [10.3389/fpsyg.2021.752249](https://doi.org/10.3389/fpsyg.2021.752249)

In order to disseminate the results obtained in 2021, we also attended a national conference: Conferința APR „Psihologie și Tehnologie: Conectați la Viitor” 2021, and presented our findings.

Bunghez, C. & Sava, F.A. (2021, November 11-14). *Rolul moderator al neuroticismului asupra efectului de condiționare afectivă: Alternarea prezentării stimulilor necondiționați pozitivi și negativi* [Conference session]. Conferința APR „Psihologie și Tehnologie: Conectați la Viitor, Online. https://conferinta.apsi.ro/?page_id=557

Huzoaița, C. & Sava, F.A. (2021, November 11-14). *Neuroticismul și Agreabilitatea ca moderator ai generalizării transferului de trăsături într-o paradigmă de Condiționare Afectivă (Studiu Preliminar)* [Conference session]. Conferința APR „Psihologie și Tehnologie: Conectați la Viitor, Online. https://conferinta.apsi.ro/?page_id=557

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