



Beauty premium: Event-related potentials evidence of how physical attractiveness matters in online peer-to-peer lending



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HIGHLIGHTS

- Beauty premium phenomenon exists in online peer-to-peer lending.
- P2P lenders are more permissive for attractive borrowers dishonest behaviors.
- Negative feedback from unattractive borrowers induced larger FRN amplitude.
- Negative/positive feedback from attractive borrowers induces no FRN deflection.

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ABSTRACT

Although it is well known that attractiveness-based impressions affect the labor market, election outcomes and many other social activities, little is known about the role physical attractiveness plays in financial transactions. With the development of online finance, peer-to-peer lending has become one of the most important ways in which businesses or individuals raise capital. However, because of information asymmetry, the lender must decide whether or not to lend money to a stranger based on limited information, resulting in their decision being influenced by many other factors. In the current study, we investigated how potential borrowers' facial attractiveness influenced lenders' attitudes toward borrowers' repayment behavior at the brain level by using event-related potentials. At the priming stage, photos of attractive borrowers induced smaller N200 amplitude than photos of unattractive borrowers. Meanwhile, at the feedback stage, compared with the condition of repaying on time, breach of repayment from unattractive borrowers induced larger feedback-related negativity (FRN) amplitude, which was a frontal-central negative deflection and would be enhanced by the unexpected outcome. Furthermore, smaller P300 amplitude was also elicited by the condition of not repaying on time. These differences in the FRN and P300 amplitudes were not observed between negative and positive feedback from attractive borrowers. Therefore, our findings suggest that the beauty premium phenomenon is present in online peer-to-peer lending and that lenders were more tolerant toward attractive borrowers' dishonest behavior.

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1. Introduction

In a seminal work, Hamermesh and Biddle found that workers of above-average beauty earn approximately 10% to 15% more

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than workers of below-average beauty [14]. This phenomenon was named as the “beauty premium”, which has been further confirmed not only in the labor market [2,8,23] but also in electoral outcomes [1], economic outcomes [33,34] and other contexts in many subsequent studies. For example, Price M K conducted a door-to-door fund-raising field experiment to explore the effects of physical appearance on fund-raising success and found that blonde females earned more on average than brunette counterparts [26]. However, little is known about the role physical attractiveness plays in financial transactions, such as in online peer-to-peer (P2P)

lending, which is now a popular way to raise capital for businesses or individuals.

In online P2P lending, lenders must evaluate loan applicants themselves with little objective information and limited objective decision criteria. That is, lenders must make decisions in the context of information asymmetry, resulting in their decisions being influenced by many other factors, such as certain personal characteristics of the borrowers [7,10]. Physical attractiveness is an important and broadly relevant personal characteristic. Previous studies have shown that loan success of P2P lending was behaviorally sensitive to the physical attractiveness of borrowers [10]. However, little is known regarding whether physical attractiveness affects the attitude of borrowers' dishonest behaviors in online peer-to-peer lending, as well as and why it happens.

Therefore, in the current study, we employed a modified traditional risk-taking paradigm to study whether and how physical attractiveness affects borrowers' attitude toward the dishonest behaviors in online peer-to-peer lending. This paradigm allowed us to explore how physical attractiveness affects subjects' neural responses toward the subsequent feedback about repayment behavior. In previous ERP studies, N200 was the most commonly examined ERP component during the processing of facial information [11,19,21,27], while FRN and P300 are always reported to appear at the feedback stage of risk-taking tasks [16,17,32]. Therefore, we used these three ERP components as candidates for the current studies.

As has been reported in previous studies, N2 is a negative component peaking at approximately 200–300 ms after the onset of stimuli [6,9]. Previous studies showed that for male participants, attractive female faces elicited larger N2 amplitudes than did unattractive female faces [18,20,38]. Previous researchers explained this phenomenon as the attention bias towards attractive opposite-sex faces and male participants' anticipation of seeing beautiful faces, indicating enhanced evaluative processing and motivated attention to female faces by male participants.

FRN is a frontal-central negative deflection that peaks at approximately 200–350 ms after presentation of feedback, and it shows maximal amplitude over medial frontal scalp locations [13,24,31]. The FRN amplitude is larger after negative feedback, such as incorrect response, game failure, or monetary loss [14–17]. Evidence from ERP source localization and fMRI studies showed that FRN is generated in the anterior cingulate cortex (ACC) [5,13,28]. Based on that evidence, a widely recognized theory about FRN was the reinforcement learning theory (RL-theory), which suggested that FRN reflected the outcome evaluation process [13,24,37]. The ACC activity is modulated by dopamine signals from the midbrain, where positive and negative prediction errors are encoded. Unexpected outcomes would induce negative prediction errors, which in turn initiate phasic decreases in dopamine inputs, resulting in increased ACC activity. This would subsequently produce an increased deflection of FRN at the medial frontal area of the scalp [15,22,36]. Therefore, in terms of reinforcement learning theory, increases in FRN amplitude are induced by unexpected feedback. Another component that appears at the feedback stage is P300, which is the most positive deflection after the presentation of feedback outcomes and typically exhibits its maximum magnitude at parietal sites [29,35]. Several studies indicated that the P300 amplitude is also sensitive to the valence of feedback, responding with higher amplitude to positive feedback than to neutral or negative feedback. This has been explained as P300 encoding the motivational/affective significance of the stimuli [13,29,35].

Based on the aforementioned reports, we hypothesized that in the current study, the unattractive faces would induce larger N200 amplitude than would attractive faces due to male participants' emotional conflict and attention bias toward attractive female photos. Furthermore, given the reinforcement learning theory and P300

reflects the motivational/affective evaluation, we also expected deflections in FRN and P300 at the feedback stage in our experiment; this was predicted to be modulated by the attractiveness of borrowers. Furthermore, we suspected that compared with positive feedback, a larger FRN amplitude and smaller P300 amplitude would be elicited by negative feedback from unattractive borrowers at the feedback stage. However, this would not be found for borrowers with attractive faces.

2. Materials and methods

2.1. Participants

Nineteen right-handed healthy male undergraduates and graduates were recruited from Ningbo University. All of the participants were native Chinese speakers without any history of neurological disorder or mental diseases. Their visual acuity was normal or corrected-to-normal. The age of the participants ranged from 19 to 27 years, with a mean age of 22.15 years (S.D. = 2.43). The participants provided written informed consent before the experiment started, and the current study was approved by the Internal Review Board of the Center for Management Decision and Neuroscience in Ningbo University.

2.2. Stimulus materials

The whole experiment consisted of 240 trials. In each trial, the first stimulus was the priming photo, which included 80 different faces of Chinese females, 40 of which were regarded as attractive and 40 as unattractive. Each of the photos was presented three times in different trials. These photos were selected from among 256 photos that were collected from the internet, all showing Chinese females. All the faces were unfamiliar to the subjects and included no movie stars, singers or other celebrities. The photos were converted to grayscale using Photoshop 7.0 (Adobe Systems Incorporated, San Jose, California, USA) software to ensure consistency in background, brightness, contrast, and color saturation and adjusted to a uniform size (4.5 by 4 cm, 220 by 200 pixels). The 256 pictures were all rated for attractiveness (from 1 = 'not attractive at all' to 5 = 'extremely attractive') by 30 male students from Ningbo University. We chose the 40 most attractive photos and the 40 most unattractive photos for use as borrowers in a peer-to-peer lending platform for the current experiment. The attractiveness ratings of the two categories of faces were compared using a paired *t*-test, wherein the facial attractiveness was significantly different ($\text{Mean}_{\text{attractive}} = 3.25$, S.D. = 0.618; $\text{Mean}_{\text{unattractive}} = 1.28$, S.D. = 0.449; $t(29) = 13.391$, $p < 0.001$). Thirty male undergraduates were also recruited to presume the age of the 80 chosen faces. It showed that the mean average of each photo ranged from 19.33–33.33. In the formal experiment, all the stimuli were classified into four blocks of 60 trials.

2.3. Procedure

The participants were asked to sit in a sound-attenuated room, 100 cm away from a computer-controlled monitor on which the stimuli were presented centrally. Before the formal experiment started, all the participants were given a brief introduction about online peer-to-peer lending and the experiment process. After they fully understood the process, they were instructed that their task was to respond with their lending intention toward the borrower shown in the photo by using a keypad.

As shown in Fig. 1, each trial began with a fixation cross against a black background for a random interval of 600–800 ms. Afterwards, the photo of the potential borrower appeared for 2000 ms. Then, the money choice appeared, and the participants had to respond

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