



The influence of negative emotion on brand extension as reflected by the change of N2: A preliminary study

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ABSTRACT

The aim of the present study is to find the neural features of the impact of induced negative emotion on brand extension. Facing three sequential stimuli in triples consisted of negative emotion pictures (stimulus 1), beverage brand names (stimulus 2), and product names (stimulus 3) in other categories, 20 participants were asked to indicate the suitability of extending the brand in stimulus 2 to the product category in stimulus 3. The stimulus triples were divided into six conditions depending on the emotion (neutral and negative) and the extension product category in stimulus 3: beverage, clothing, and the household appliance. A negative component reflecting conflict, N2, was recorded for each condition on the subjects' scalp. The induced negative emotion elicited significantly larger amplitude of N2 than did the induced neutral emotion in the moderate extension type (extending to the clothing product), whereas no significant difference was observed in any of the other two extension types. The findings indicate that the induced negative emotion has a specific negative impact on moderate brand extension, and the amplitude of N2 can be viewed as a reference measure reflecting such effect.

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Brand extension refers to the use of well-known brand names for new product introductions [24,1]. The strategy of brand extension is a critical element of the strategy management in an enterprise, and has become widespread [24].

The key for the success of brand extensions is the consumers' acceptance of the new products under the original brand. Since a brand can be considered as a category of products with some similar attributes [5], people's attitude towards brand extensions is determined by their categorization results [6,14,16]. Researchers suggested that the success of brand extension depends on the perception of how well the extension products match the original brand in consumers' brand-cognitive process. The more consistent the consumer perceives between extension product and original brand, the easier the brand extension will be accepted [1,7,13,18,19].

Since emotion has global effects on all aspects of cognition [9], the consumer's evaluation of brand extension must be influenced by their emotion. In the field of marketing research, a body of studies showed that the positive emotion primarily enhances the evaluations of brand extensions which were viewed as moderately similar (as opposed to very similar or dissimilar) to the original brand [2–4], while few studies considered the impact of negative

emotion on brand extension, despite the negative emotion is pervasive and hard to avoid in daily life.

A series event-related potential (ERP) studies suggested a negative component N2 reflects conflict and template mismatch [8,10,16,23,25]. As far as brand extension evaluation is concerned, Ma et al. [16] have found that if the product does not belong to the category of its original brand, a conflict will occur and a larger N2 (N270) can be recorded.

Based on the mood congruency theory [17], we hypothesized that people under the induced negative emotion tend to reject the brand extension. The formation of such attitude is accompanied by an increased conflict, which can be reflected by the magnified amplitude of N2. Furthermore, according to the findings of Barone et al. [4], we inferred that such negative influence of the induced negative emotion on the evaluation of brand extension only occurs in the case of moderate brand extension, and N2 can be taken as the ERP component reflecting such effect. To look for the neural evidence underpinning the hypothesis, we first gave the negative emotion stimuli to the participants in this experiment, and then asked them to evaluate whether or not to accept the extension that they saw in each trial.

Twenty right-handed students (10 male) aged 20–30 (mean = 23.95, SD = 2.39) were recruited in this study. All subjects have normal or corrected-to-normal visual acuity, and do not have any history of neurological or mental diseases. They gave informed consent prior to the study.

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Three negative and three neutral pictures were selected from the International Affective Picture System (IAPS) for use during this study.¹ The valence and arousal of these pictures were evaluated by the participants on a 7-point scale (ranging from 1 to 7), separately with anchors ranging from “strongly unpleasant” to “strongly pleasant” and “very calm” to “very exciting” after the experiment. It showed that these pictures were effective to induce negative and neutral emotions, respectively (negative stimulus: means = 1.23, SD = 0.50; neutral stimulus: means = 4.30, SD = 0.72).

Three brands of beverage (Coca, Wahaha, and Nongfu Spring) were selected from Chinese ‘Well-known Trademark List’ of CTMO (Trademark Office under the State Administration for Industry & Commerce, China). These brands were regarded as culturally familiar and favorable since the participants were screened in advance by a special Brand Familiarity Test, i.e. the participants who were not familiar these brands were excluded before the EEG measure. Further, these beverage brands have not been extended to other industrial areas in the Chinese market, and the words of the three brands were limited to no more than four Chinese characters.

Twelve product names, each of which made of two Chinese characters, were selected from three categories (four products per category) as the extension targets of the beverage brands mentioned above. These products categories comprised (i) beverage category: cola, milk, black tea, and juice; (ii) clothing category: trousers, shirt, shoes, and skirt; (iii) household appliance category: television, refrigerator, air-condition, and fanner.

Before the experiment, 69 student volunteers (37 males) aged 22–41 (mean = 24.64, SD = 2.31) were invited to evaluate the distance between each of the beverage brands (Coca, Wahaha, and Nongfu Spring) and each of the three types of extension products (beverage, clothing, and household appliance), and to rate their perceived difficulty according to the evaluated distances on a 5-point scale (ranging from 1 to 5), separately with anchors ranging from “very close” to “very far” and from “very easy to evaluate” to “very difficult to evaluate”. The results indicated that the distance from the beverage brands category to the target beverage category (B–B) (mean = 2.86, SD = 1.59) was significantly smaller ($t = -12.435$, $p = 0.000$) than that to clothing category (B–C) (mean = 4.39, SD = 0.78), which in turn was significantly smaller ($t = -3.064$, $p = 0.002$) than that to household appliance category (B–H) (mean = 4.60, SD = 0.66). These results suggested that the extension from beverage to clothing (B–C) is moderate, extension (B–B) is similar, and extension (B–H) is dissimilar. As to the perceived evaluation difficulty, the difficulty in evaluating the extension of B–C (mean = 2.41, SD = 1.03) is significantly higher ($t = 7.948$, $p = 0.000$) than that of B–B (mean = 1.73, SD = 0.66) and higher ($t = 9.337$, $p = 0.000$) than that of B–H (mean = 1.59, SD = 0.72). However, the difficulty in evaluating the extension of B–B is not significantly different from that of B–H ($p = 0.112$).

The stimuli consisted of 216 triples of emotion picture (S1)–brand name (S2)–product name (S3), i.e. 6 emotion pictures (3 negative, 3 neutral) \times 3 brand names \times 12 product names. These stimuli were presented to each participant in the center of a computer-controlled video monitor (Stim 2, Neurosoft Labs, Inc., Sterling, Virginia, USA).

Each trial began with a cross for 500 ms, followed by the emotion stimulus picture (S1), then brand name (S2) and then product name (S3), which were always presented at the center of the screen for 1000 ms each, with a visual angle of $2.58^\circ \times 2.4^\circ$. And the interstimulus intervals between S1 and S2, and S2 and S3 were both randomly varied from 300 to 700 ms (average interstimulus

was 500 ms). The interval between the two continuous trials was 1000 ms.

Electroencephalogram (EEG) was continuously recorded (band pass 0.05–100 Hz, sampling rate 500 Hz) with Neuroscan Synamp2 Amplifier (Scan 4.3.1, Neurosoft Labs, Inc. Sterling, USA), using an electrode cap with 64 Ag/AgCl electrodes mounted according to the extended international 10–20 system and referenced to linked mastoids. Vertical and horizontal electrooculograms were recorded with two pairs of electrodes, on placed above and below the right eye, and another 10 mm from the lateral canthi. Electrode impedance was maintained below 5 k Ω throughout the experiment. Following electrode application, participants sat in a comfortable chair located in a shielded room and were asked to fix a point in the center of the computer displayed located 1 m away from his/her eyes.

On each trial, after the prime of emotion pictures (S1), the participant was asked to determine whether or not to accept the products (S3) with the brand shown in S2, and to press the left button of a push pad as fast as possible if they accepted the brand extension, otherwise to press the right button. This should be completed within 2000 ms since the product name's onset; if not, the next trial would start automatically. Each participant was instructed to use the left hand for half of the trials and the right hand for the other half. Following 24 practice trials, the 216 stimulus trials were presented.

Electroencephalogram recordings were segmented for a time period from 200 ms before onset of the product name (S3) appearing on the video monitor to 800 ms after this onset with the first 200 ms prestimulus as a baseline. Electrooculogram artifacts were corrected using the method proposed by Semlitsch et al. [22]. Trials contaminated by amplifier clipping, bursts of electromyographic activity, or peak-to-peak deflection exceeding $\pm 80 \mu V$ were excluded from averaging. The remaining trials were baseline corrected. The electroencephalogram segments were averaged separately for each product category (beverage, clothing, and household appliances) in both the negative and neutral emotion, and the averaged ERPs were digitally filtered with a low-pass filter at 30 Hz (24 dB/Octave). To validate the hypotheses of this research, within subjects repeated measure of analysis variance (ANOVA)s were used to behavior and ERP data, and the Greenhouse–Geisser correction was employed when necessary (corrected p -value was reported).

The acceptance rate (AR) and reaction time (RT) were analyzed separately using 2 (emotion: negative vs. neutral) \times 3 (extension type: similar, moderate and dissimilar) ANOVA. The analysis for AR only revealed a significant effect for extension type ($p = 0.000$) but neither an effect of emotion nor an interaction between extension type and emotion. The ANOVA on RT revealed no main effects of emotion or extension type and no interaction between these two factors. Post hoc paired samples t -test with extension type as fixed factor showed, however, that the emotion factor had a negative impact on the moderate extension type for AR and RT. In Fig. 1 it is visualized that the AR was significantly smaller, and the RT was significantly longer in the moderate brand extension (B–C) under the induced negative emotion than under the induced neutral emotion (AR rate (negative emotion) = 5.6%, SD = 21.6; AR (neutral emotion) = 7.3%, SD = 22.0; $t = -2.511$, $p = 0.021$; and RT (negative emotion) = 641.4 ms, SD = 146.6; RT (neutral emotion) = 612.8 ms, SD = 105.3; $t = 2.314$; $p = 0.032$), respectively. But both behavior results (AR and RT) in the other two extensions (B–B, and B–H) in negative emotion condition are not significantly different from those in neutral emotion condition, respectively. These results suggested that the induced negative emotion has negative impact on the evaluation on the moderate brand extension.

Following the onset of the product name (S3), remarkable negative wave N2 was recorded in widespread scalp areas for all three

¹ Negative pictures were IAPS slides 3016, 3064, and 3068. Neutral pictures were IAPS slides 7004, 7009, and 7950.

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