

Exploratory Excitability and Sensation Seeking as Moderating Factors on the Mere Exposure Effect

Jacky Au
The University of Sydney
Australia

Cokorda Bagus Jaya Lesmana
Udayana University
Indonesia

Niko Tiliopoulos
The University of Sydney
Australia

The *mere exposure effect* (Zajonc, 1968) proposes that repeated exposure to a stimulus enhances one's attitude towards it. The present study examined the moderating effects of sensation seeking and exploratory excitability on the mere exposure effect. Eighty-five females were exposed to photographs of faces subliminally. Participants completed the *Sensation Seeking Scale* (SSS-V) and the *IPIP Variety-seeking questionnaires* and provided liking and recognition ratings for faces previously viewed 0, 1, 2, 5, 10, or 25 times. Liking ratings did not vary as a function of exposure frequency. Sensation seeking failed to moderate the effect of exposure on liking for facial stimuli. Exploratory excitability appeared to interact with frequency of exposure, such that higher variety-seeking was associated with an increased liking for novel faces and a decreased liking for repeatedly exposed faces but the significance of this finding was questionable. Interpretation of these results, methodological limitations and directions for future research are discussed.

Keywords: personality, exploratory excitability, sensation seeking, mere exposure effect

Efek paparan sederhana (Zajonc, 1968) mengusulkan bahwa paparan berulang pada suatu stimulus meningkatkan sikap seseorang ke arah paparan. Penelitian ini meneliti efek kendali dari pencarian sensasi dan rangsangan eksplorasi pada efek paparan sederhana. Delapan puluh lima perempuan ditunjukkan foto-foto wajah secara terselubung. Peserta menyelesaikan *Sensation Seeking Scale* (SSS-V) dan kuesioner *IPIP variety-seeking* dan memberikan tingkat pengakuan dan keinginan untuk foto-foto wajah yang dilihat sebelumnya sebanyak 0, 1, 2, 5, 10, atau 25 kali. Tingkat menyukai tidak bervariasi dalam fungsi dari tingkat paparan. Mencari sensasi gagal mengendalikan pengaruh paparan terhadap keinginan untuk rangsangan wajah. Rangsangan eksplorasi terlihat berinteraksi dengan frekuensi paparan, seperti dalam hal ragam keinginan yang lebih tinggi dikaitkan dengan meningkatnya keinginan menyukai wajah yang baru dan menurun menyukai paparan wajah yang berulang, tetapi kemaknaan dari temuan masih dipertanyakan. Interpretasi dari hasil, keterbatasan metodologi dan arah untuk penelitian lanjutan dibahas dalam studi ini.

Kata kunci: kepribadian, rangsangan eksplorasi, pencarian sensasi, efek paparan sederhana

Repeated exposure to a stimulus enhances one's attitude towards the stimulus. Further exposure to the stimulus strengthens the exposure effect but only up to a saturation point, where additional exposures then causes decreases in positive affect and increases in negative affect. This is known as the mere exposure effect (Zajonc, 1968). Previous studies have focused on how methodological variables affect the strength of the exposure effect and

have largely ignored the influence of subject variables (Bornstein, 1989; Harmon-Jones & Allen, 2001). This study sought to address this gap by investigating the effects of personality differences on the mere exposure effect. Knowledge in this area could lead to practical implications in everyday life, such as explaining differences in susceptibility to advertising, differing attitudes towards ethnic minorities, and the development of interpersonal relationships.

The mere exposure effect postulates that initial exposure to a stimulus increases one's positive affect towards the stimulus, even in the absence of reinforcement (Zajonc, 1968). Further exposure to the stimulus strengthens the

Correspondence concerning this article should be addressed to Niko Tiliopoulos, School of Psychology, Brennan MacCallum Building (A18), The University of Sydney, Sydney, NSW 2006, Australia. E-mail: niko.tiliopoulos@sydney.edu.au; Ph: +61290369223; Fax: +61290365223

exposure effect but only up to a certain point. Once saturation has been reached, additional exposures causes decreases in positive affect and increases in negative affect. As a function of exposure, positive evaluation of a stimulus assumes the form of an inverse U-shaped curve.

In Berlyne's (1970) two-factor model, the predicted inverted U-shaped curve illustrates the effects of the positive habituation and tedium factors, with liking increasing and declining as a function of exposure. However, the model predicts that stimulus recognition is a prerequisite for the exposure effect, which is inconsistent with studies that obtained robust mere exposure effects with stimuli presented at extremely brief exposure durations (Kunst-Wilson & Zajonc, 1980). Bornstein's (1989) revised two-factor model accommodated for exposure effects produced by stimuli perceived without awareness. Enhanced affect is due to a reduction in uncertainty as a result of familiarity, which occurs either consciously or unconsciously. This allows for changes in affect through implicit learning, where processing takes place outside of conscious awareness. However, a meta-analysis revealed that stimuli not recalled at a rate better than chance produced considerably stronger exposure effects than stimuli that were consciously perceivable (Bornstein, 1989). We suggest that two-factor models cannot accommodate for these results as they predict that stimuli perceived without awareness produce weaker exposure effects than stimuli that are consciously perceived.

The perceptual fluency/misattribution model (PF/M; Bornstein and D'Agostino, 1992; Bornstein & D'Agostino, 1994) states that repeated exposure to a stimulus increases perceptual fluency by increasing the speed and accuracy at which it can be processed (Jacoby & Dallas, 1981). Individuals who are able to identify the true source of the perceptual fluency (e.g. prior exposure) should be able to attribute the fluency to its actual cause (Bargh, 1992), and affect ratings of previously exposed stimuli will be lowered to compensate for this misattribution. However, if a stimulus is presented subliminally, perceptual fluency is enhanced but respondents are unaware that they have been exposed to that specific stimulus. Therefore, the PF/M predicts that recognisable stimuli produce weaker exposure effects than subliminal stimuli as awareness of their prior exposure brings about a correctional process.

Personality differences appear to moderate affective responses to repeated stimulus exposures (see Bornstein, 1989; Harmon-Jones & Allen, 2001). More specifically, people with higher scores on need for approval and tolerance of ambiguity (Crandall, 1968) and *manifest anxiety* (Schick, McGlynn, & Woolam, 1972) and lower scores in *boredom proneness* (Bornstein, Kale, & Cornell,

1990) appear to respond more favourably to novel stimuli. Furthermore, Harmon-Jones and Allen (2001) found that respondents who reported either or both more negative affect and less positive affect evidenced a larger mere exposure effect. Finally, Hunter and Schellenberg (2011) found an interaction effect for *openness to experience*, with a more pronounced increase in liking for novel music excerpts and a greater decrease in liking for overexposed excerpts for respondents who were high on openness.

Zuckerman's (1979) sensation seeking could also predict individual differences in affective responding to repeatedly exposed stimuli (see Hunter & Schellenberg, 2011). Sensation seeking is defined as a need for variety and novelty in one's sensations and experiences (Zuckerman, 1979, 1994). Pheterson and Horai (1976) found high sensation seekers were more likely to be positive towards photographs of attractive people than unattractive people, whereas low sensation seekers did not differ between the two.

Novelty seeking, a personality trait in Cloninger's (1994) Temperament & Character Inventory (TCI), is characterised by an exploratory pursuit of novelty and an active avoidance of monotony (Cloninger, 1987). Exploratory excitability, a lower-order facet of novelty seeking, refers to the intensity of exhilaration in one's exploratory activity in response to novel stimuli. Based on this definition, exploratory excitability is likely to be associated with the exposure effect.

The purpose of this study was to investigate whether personality differences influenced the strength of the mere exposure effect. It was hypothesised that the association between degree of liking for stimuli presented and the number of exposures followed an inverted U-shaped function, such that liking increased linearly after initial exposures, then decreased linearly from later exposures. It was also anticipated that sensation seeking and relevant facets of novelty seeking moderated liking for merely exposed stimuli as a function of previous exposure. That is, higher scores on sensation seeking and exploratory excitability were predicted to be associated with an increased liking for novel stimuli and a decreased liking for previously exposed stimuli compared to those with lower scores.

Method

Materials

Facial stimuli. Stimuli consisted of 20 greyscale images of neutral faces of Caucasian females 18-29 years of age, drawn from The Center for Vital Longevity Face Database (<https://pal.utdallas.edu/facedb/request/index>)

(Minear & Park, 2004). Images were divided into Set A and Set B. Liking ratings were rated on a 7-point scale (1 = 'I strongly dislike this person', 7 = 'I strongly like this person'), as well as recognition judgements (1 = 'I am extremely sure I have not seen this person before', 7 = 'I am extremely sure I have seen this person before').

Sensation seeking scale - Form V (SSS-V). A 40-item inventory (Zuckerman, 1979; Zuckerman, 1994; Zuckerman et al., 1978) comprised of four subscales: thrill and adventure seeking (TAS; $\alpha = .75$), experience seeking (ES; $\alpha = .56$), disinhibition (Dis; $\alpha = .73$), and boredom susceptibility (BS; $\alpha = .45$). Items are in a forced-choice format (e.g. 'I like "wild" inhibited parties' vs. 'I prefer quiet parties with good conversation').

International personality item pool (IPIP). Exploratory excitability was measured with its corresponding instrument from the International Personality Item Pool (IPIP; Goldberg, 1999; Goldberg et al., 2006) known as Variety-seeking. The variety-seeking scale has good internal consistency ($\alpha = .80$). Its 10 items are statements related to change (e.g. 'I prefer to stick with things that I know') and respondents rated the accuracy of the statement on a five-point scale (1 = 'very inaccurate', 5 = 'very accurate').

Participants and Design

Female first-year psychology students at the University of Sydney were recruited from a pool of undergraduate students via SONA and participated in exchange for partial course credit. Participants were excluded if they were not female, Caucasian, or between 16 to 29 years of age. Other exclusion criteria include failure to complete all questionnaires, lost data, and biased responding. A final total of 85 participants completed the experiment, ages ranging from 18 to 29 years ($M = 18.94$ years, $SD = 1.86$ years).

With a repeated measures design, stimulus liking was tested across six levels of exposure frequency. Photographs of faces were presented subliminally. To minimize similarity bias, the sample and the photographs consisted of Caucasian females of 18-29 years of age. Participants were randomly assigned to Set A or Set B, in which photographs presented during the exposure phase

differed. Half of the photographs shown during the rating task were previously viewed, the remaining photographs represented novel stimuli. Participants' sensation seeking, exploratory excitability, liking and recognition ratings of photographs were measured through the above mentioned scales.

Procedure

It was explained to participants that the study involved observing and making affective judgements on visual stimuli. Participants completed an online questionnaire assessing demographic variables, then randomly assigned to Set A ($n = 44$) or Set B ($n = 41$). The exposure phase and the rating task were programmed using Inquisit (Inquisit 3.0.5.0, 2011). The exposure phase consisted of 86 subliminal presentations. Presented stimuli were below the recognition threshold, with two faces exposed at each frequency (1, 2, 5, 10, 25 times). Allocation of faces to frequencies and the presentation order were random. In each trial, a fixation cross appeared for 2000 ms, a forward mask (random dot noise pattern) for 17 ms, a facial stimulus for 17 ms, followed by a backward mask (random dot noise pattern) for 33 ms, then a black rectangle. Participants pressed the space bar when the rectangle appeared. The inter-trial interval was fixed at 500 ms. The SSS-V and variety-seeking questionnaires were created and implemented using LimeSurvey (LimeSurvey 1.87+, 2010). Participants completed the questionnaires on a computer, and then rated 10 previously exposed faces and 10 new faces on liking and recognition.

Results

Preliminary Analyses

Statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS 17.0.1, 2008) with an alpha level of .05. Mean liking scores were calculated at each exposure frequency. Liking at zero exposures was calculated as an average of 10 new

Table 1

Summary of Repeated Measures ANOVAs for Liking and Recognition Ratings as a Function of Exposure

	0	1 Exposure	2	5	10	25	F	df
	Exposures	Exposures	Exposures	Exposures	Exposures	Exposures		
Liking	3.98 (0.58)	4.02 (0.81)	3.85 (1.00)	4.02 (0.84)	4.04 (0.95)	3.86 (0.86)	1.41	4.41, 370.6
Recognition	2.21 (1.29)	2.20 (1.39)	2.08 (1.35)	2.25 (1.46)	2.24 (1.50)	2.11 (1.41)	1.12	4.30, 360.8

Note. $N = 85$; figures in parentheses are SDs

faces, while liking for previously viewed faces were averaged over the two faces at each frequency. Mean recognition ratings were similarly calculated. The mean sensation seeking score was 20.16 ($SD = 5.11$) and the mean variety-seeking score was 37.51 ($SD = 5.37$).

Relationship Between Number of Exposures, Liking Ratings, and Recognition Ratings

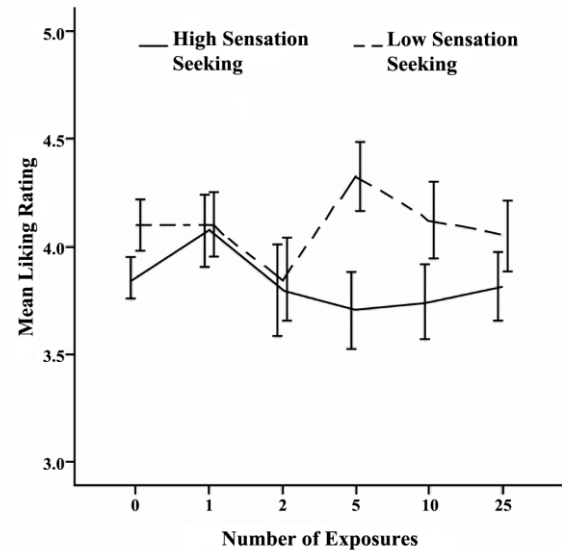
A one-way repeated measures ANOVA tested whether liking for stimuli varied as a function of exposure. Mauchly's test of sphericity indicated that sphericity had not been met, $\chi^2(14) = 59.60$, $p < .001$, so degrees of freedom were corrected using Huynh-Feldt correction (Huynh & Feldt, 1976; $\epsilon = 0.83$), indicating that exposure frequency on liking was not statistically significant, $F(4.41, 370.6) = 1.41$, $p = .23$. Trend analyses revealed that the linear, $F(1, 504) = .68$, $p = .41$, quadratic, $F(1, 504) = 1.07$, $p = .30$ and cubic trends, $F(1, 504) = 0.36$, $p = .55$ were not significant. Mean recognition ratings were tested for differences between levels of exposure with a one-way repeated ANOVA, but there were no statistically significant differences, $F(4.30, 360.8) = 1.12$, $p = .35$. The results for each analysis are presented in Table 1.

Personality and the Mere Exposure Effect

An extreme groups approach was adopted to examine personality differences in liking between high- and low-scoring participants. Participants were divided into high-, medium-, and low-scoring groups according to their sensation seeking and variety-seeking scores. The intermediate group for each variable was excluded from further analyses.

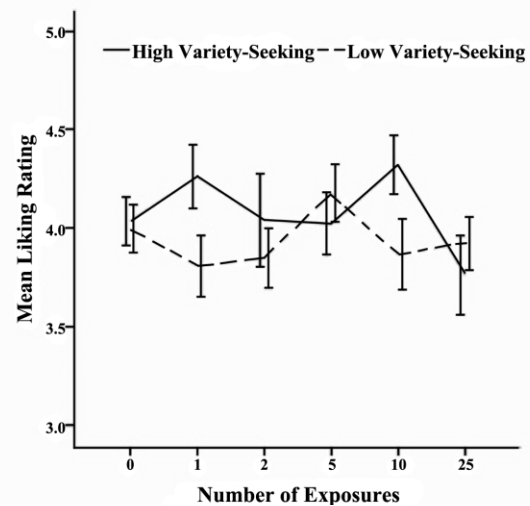
A 2 (sensation seeking: high or low) \times 6 (exposure frequency: 0, 1, 2, 5, 10, 25) mixed ANOVA was performed with sensation seeking group as the between-subjects factor and frequency of exposure as the within-subjects factor. There were no significant main effects of sensation seeking, $F(1, 54) = 2.22$, $p = .14$, or exposure, $F(4.69, 253.4) = 1.12$, $p = .35$, nor an interaction between sensation seeking and exposure, $F(4.69, 253.4) = 1.68$, $p = .14$ (Figure 1).

Similarly, a mixed ANOVA with variety-seeking group as the between-subjects variable revealed that neither variety-seeking, $F(1, 49) = .69$, $p = .41$, nor exposure frequency, $F(3.64, 178.4) = 1.27$, $p = .28$, produced a main effect for liking (Figure 2). However, a significant interaction effect between variety-seeking and exposure was demonstrated, $F(3.64, 178.4) = 2.59$, $p < .05$, and it appeared that participants with



Note. Error Bars ± 1 SE

Figure 1. Exposure frequency on liking ratings of faces according to high sensation seeking ($n = 27$) or low sensation seeking ($n = 29$).



Note. Error Bars ± 1 SE

Figure 2. Exposure frequency on liking ratings of faces according to high variety-seeking ($n = 25$) or low variety-seeking ($n = 26$).

high scores on variety-seeking were more likely to rate novel faces favourably and repeatedly exposed faces unfavourably. The results from these analyses are summarised in Table 2.

Discussion

The present study investigated the effects of specific personality differences on liking for faces

Table 2

Summary of Repeated Measures ANOVAs Testing Effects of Personality Variables and Exposure Frequency on Liking for Faces

	<i>Personality Main Effect</i>		<i>Exposure Main Effect</i>		<i>Personality X Exposure Interaction</i>	
	<i>F</i>	<i>df</i>	<i>F</i>	<i>df</i>	<i>F</i>	<i>df</i>
Sensation Seeking	2.22	1, 54	1.12	4.69, 253.4	1.68	4.69, 253.4
Variety-Seeking	0.69	1, 49	1.27	3.64, 178.4	2.59*	3.64, 178.4

Note. $N = 85$; * $p < .05$

as a function of exposure. Contrary to previous research, a relationship between exposure and liking was not observed. Sensation seeking did not moderate the effect of exposure on liking for faces. The hypothesis that variety-seeking moderates the mere exposure effect was partially supported, as high variety-seeking was associated with an increased liking for novel faces and a decreased liking for repeatedly exposed faces.

Effects of Repeated Exposure on Liking

Although findings from earlier research demonstrated that the mere exposure effect is rather robust and replicable (Bornstein, 1989), a number of published papers, including our study, failed to detect a subliminal effect between exposure and liking (Fox & Burns, 1993; Newell & Shanks, 2003; Newell & Shanks, 2006). The inconsistency in these findings could be to a degree attributed to methodological issues. For example, the stimuli selected can have a detrimental effect on observed outcomes. Simple stimuli such as geometric shapes (e.g. Kunst-Wilson & Zajonc, 1980) are usually used in mere exposure studies, because they avoid confounding factors such as prior familiarity. Arguably, this could be more problematic with complex stimuli such as photographs, though exposure effects have been found for faces presented supraliminally (Zajonc, 1968) and subliminally (Bornstein & D'Agostino, 1992; Harmon-Jones & Allen, 2001; Murphy & Zajonc, 1993). A large number of processes are involved in the reception, encoding, recognition, and elicitation of facial expressions (Adolphs, 2002; Posamentier & Abdi, 2003). Facial cues are a valuable source of affective information, such as a person's attractiveness (Miller, 1970) and facial expressions (Mueser, Grau, Sussman, & Rosen, 1984), and can influence an observer's affective reaction towards that person. The faces selected as visual stimuli for this study were controlled for gender, ethnicity, perceived age, familiarity, perceived mood, memorability, and picture quality, but not for attractiveness, facial feature configuration, or other physical qualities that may have affected the results.

Additionally, variations in the facial expressions of stimuli may play a role in the inconsistencies between the studies. For example, in our study we used faces with neutral expressions, as it was anticipated that this would minimise the influence of emotional valence of facial expressions, as there is evidence of an emotion-based attentional bias (Bradley et al., 1997) as well as a memory bias (Shimamura, Ross, & Bennett, 2006). However, the insufficient differences in liking with the faces we used, perhaps indicate that participants mainly responded in an intermediate fashion (cf. Bornstein & D'Agostino, 1992; Harmon-Jones & Allen, 2001). Neutral faces lack the appeal of expressive faces that are more interesting to the perceiver. William (2003), for example, found an exposure effect with affectively positive faces but not for affectively neutral faces, suggesting that the exposure effect is not limited to neutrally valenced stimuli.

Finally, as no exposure effect was observed, this study was unable to establish whether a negative relation existed between liking and recognition. It could not be verified whether knowledge about perceived stimuli could take place outside conscious awareness. However, given that exposure effects have previously been found for stimuli presented below conscious awareness, from exposure durations ranging from 5 ms (Bornstein & D'Agostino, 1994) to 98 ms (Harmon-Jones & Allen, 2001), presentation of stimuli at suboptimal exposures cannot be implicated as a reason for the failure to find an exposure effect.

Sensation Seeking

The findings indicate that sensation seeking does not influence the exposure-affect relationship. A possible explanation for this result is that sensation seeking moderates responses according to the arousal potential of the stimulus. Zaleski (1984) reported that when individuals were given the choice to select from positive, negative, or neutral pictures, among those who chose neutral pictures, there was no difference between high and low sensation seeking groups in preference for

unemotional stimuli. This may explain why sensation seeking, both high- and low-scoring groups, had a similar, non-existent effect on affective reactions towards neutral faces, further highlighting that affectively valenced stimuli should have been used in this study.

Exploratory Excitability

The results support the prediction that the exploratory excitability subscale is a moderator of the relation between exposure frequency and liking. Individuals who scored highly on exploratory excitability gave higher ratings to relatively novel faces (0, 1, 2 exposures) than their lower-scoring counterparts. In contrast, individuals who scored low gave higher ratings to overly exposed faces (25 exposures) compared to those who scored high. However, the interaction between exploratory excitability and exposure is somewhat difficult to interpret; whereas Hunter and Schellenberg (2011) found an exposure main effect for openness to experience, no such effect was observed for exploratory excitability. The only noteworthy difference in liking ratings between high and low scorers in exploratory excitability was for faces presented once, where higher levels were associated with greater liking for relatively novel faces. Exploratory excitability, and by association probably novelty seeking, appears to be a moderator of the relationship between exposure and liking.

Assuming that exploratory excitability plays a moderating role on the mere exposure effect and sensation seeking does not, why might this be the case? The specificity of the exploratory excitability subscale provides an obvious advantage over the broader and more general sensation seeking measure. Exploratory excitability is the experience of exhilaration associated with frequent exploratory activity in relation to novel stimuli and the active avoidance of monotony (Cloninger, 1987) which is highly relevant to the mere exposure effect. Furthermore, a major distinction of novelty seeking as a personality trait lies in its psychobiological basis. Unlike sensation seeking, which was derived by factor analysis, the development of Cloninger's (1999) TCI-R was based on genetic, pharmacological, and psychosocial data (Cloninger, 2008).

Future Directions

The main strength of this study is its use of socially relevant stimuli and its applicability to real-life situations. It can be predicted that high novelty seeking individuals

are more inclined to have a favourable attitude towards complete strangers, and are more likely to develop positive interpersonal relationships with unfamiliar people. The usefulness and generalizability of this inference, however, needs to be re-examined. For example, by not restricting the age, gender, or ethnicity of the sample, future research could examine the influence of subject variables and test for age, gender, or ethnic differences in the mere exposure effect.

Furthermore, the present findings neither provides support for two-factor models like Bornstein's (1989) revised two-factor model as liking ratings for merely exposed faces did not decrease after a large number of exposures, nor PF/M as the stimuli were only presented subliminally and participants were unable to distinguish between previously exposed and new faces. The introduction of a between-subjects variable, where stimuli are presented either supraliminally or subliminally, would help verify which model best accounts for exposure effects.

Conclusion

This study attempted to extend Hunter and Schellenberg's (2011) findings that liking varied as a function of personality and exposure by testing sensation seeking and exploratory excitability as personality moderators of the mere exposure effect. The results are inconclusive for the sensation seeking construct. The interaction between exploratory excitability and exposure appears meaningful, but must be interpreted with caution given the absence of main effects. Further investigations with socially relevant stimuli could help the understanding of the effects of individual differences underlying the cognitive and affective processes of exposure effects pertaining to the domain of social settings and interpersonal contexts.

References

- Adolphs, R. (2002). Recognizing emotion from facial expressions: Psychological and neurological mechanisms. *Behavioral and Cognitive Neuroscience Reviews*, 1, 21-62.
- Bargh, J. A. (1992). Does subliminality matter to social psychology? Awareness of the stimulus versus awareness of its influence. In R. F. Bornstein & T. S. Pittman (Eds.), *Perception without awareness: Cognitive, clinical, and social perspectives* (pp. 236-255). New York: Guilford Press.
- Berlyne, D. E. (1970). Novelty, complexity, and hedonic value. *Perception and Psychophysics*, 8, 279-286.

- Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research, 1968-1987. *Psychological Bulletin*, 106, 265-289.
- Bornstein, R. F., & D'Agostino, P. R. (1992). Stimulus recognition and the mere exposure effect. *Journal of Personality and Social Psychology*, 63, 545-552.
- Bornstein, R. F., & D'Agostino, P. R. (1994). The attribution and discounting of perceptual fluency: Preliminary tests of a perceptual/attributional model of the mere exposure effect. *Social Cognition*, 12, 103-128.
- Bornstein, R. F., Kale, A. R., & Cornell, K. R. (1990). Boredom as a limiting condition on the mere exposure effect. *Journal of Personality and Social Psychology*, 58, 791-800.
- Bradley, B. P., Mogg, K., Millar, N., Bonham-Carter, C., Fergusson, E., & Jenkins, J., et al. (1997). Attentional biases for emotional faces. *Cognition and Emotion*, 11, 25-42.
- The Center for Vital Longevity Face Database. Retrieved from the University of Michigan website: <http://vitallongevity.utdallas.edu/stimuli/facedb.html>
- Cloninger, C. R. (1987). A systematic method for clinical description and classification of personality variants. *Archives of General Psychiatry*, 44, 573-588.
- Cloninger, C. R. (1993). A psychobiological model of temperament and character. *Archives of General Psychiatry*, 50, 975-990.
- Cloninger, C. R. (1994). *The Temperament and Character Inventory (TCI): A guide to its development and use*. St. Louis, MO: Centre for Psychobiology of Personality, Washington University.
- Cloninger, C. R. (1999). *The Temperament and Character Inventory-Revised*. St. Louis, MO: Centre for Psychobiology of Personality, Washington University.
- Cloninger, C. R. (2008). The psychobiological theory of temperament and character: Comment on Farmer and Goldberg (2008). *Psychological Assessment*, 20, 292-299.
- Crandall, J. E. (1968). Effects of need for approval and intolerance of ambiguity upon stimulus preference. *Journal of Personality*, 36, 67-83.
- Farmer, R. F., & Goldberg, L. R. (2008). A psychometric evaluation of the revised Temperament and Character Inventory (TCI-R) and the TCI-140. *Psychological Assessment*, 20, 281-291.
- Fox, S. E., & Burns, D. J. (1993). The mere exposure effect for stimuli presented below recognition threshold: A failure to replicate. *Perceptual and Motor Skills*, 76, 391-396.
- Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.
- Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., & Cloninger, C. R., et al. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality*, 40, 84-96.
- Gray, J. M., & Wilson, M. A. (2007). A detailed analysis of the reliability and validity of the sensation seeking scale in a UK sample. *Personality and Individual Differences*, 42, 641-651.
- Harmon-Jones, E., & Allen, J. J. B. (2001). The role of affect in the mere exposure effect: Evidence from psychophysiological and individual differences approaches. *Personality and Social Psychology Bulletin*, 27, 889-898.
- Hunter, P. G., & Schellenberg, E. G. (2011). Interactive effects of personality and frequency of exposure on liking for music. *Personality and Individual Differences*, 50, 175-179.
- Huynh, H., & Feldt, L. S. (1976). Estimation of the Box correction for degrees of freedom from sample data in the randomized block and split-plot designs. *Journal of Educational Statistics*, 1, 69-82.
- Inquisit 3.0.5.0 [Computer software]. (2011). Seattle, WA: Millisecond Software LLC.
- International Personality Item Pool: A scientific laboratory for the development of advanced measures of personality and other individual differences. Retrieved from <http://ipip.ori.org>
- Jacoby, L. L., & Dallas, M. (1981). On the relationship between autobiographical memory and perceptual learning. *Journal of Experimental Psychology: General*, 110, 306-340.
- Kunst-Wilson, W. R., & Zajonc, R. B. (1980). Affective discrimination of stimuli that cannot be recognized. *Science*, 207, 557-558.
- LimeSurvey 1.87+ [Computer software]. (2010). Retrieved from <http://www.limesurvey.org/>
- Miller, A. G. (1970). Role of physical attractiveness in impression management. *Psychometric Science*, 19, 241-243.
- Minear, M., & Park, D. C. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments, & Methods*, 36, 630-633.
- Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology*, 64, 723-739.
- Mueser, K. T., Grau, B. W., Sussman, S., & Rosen, A.

- J. (1984). You're only as pretty as you feel: Facial expression as a determinant of physical attractiveness. *Journal of Personality and Social Psychology*, 46, 469-478.
- Newell, B. R., & Bright, J. E. H. (2003). The subliminal mere exposure effect does not generalize to structurally related stimuli. *Canadian Journal of Experimental Psychology*, 57, 61-68.
- Newell, B. R., & Shanks, D. R. (2006). Recognising what you like: Examining the relation between the mere-exposure effect and recognition. *European Journal of Cognitive Psychology*, 19, 103-118.
- Pheterson, M., & Horai, J. (1976). The effects of sensation seeking, physical attractiveness of stimuli, and exposure frequency on liking. *Social Behavior and Personality*, 4, 241-247.
- Posamentier, M. T., & Abdi, H. (2003). Processing faces and facial expressions. *Neuropsychology Review*, 13, 113-143.
- Schick, C., McGlynn, R. P., & Woolam, D. (1972). Perception of cartoon humor as a function of familiarity and anxiety level. *Journal of Personality and Social Psychology*, 24, 22-25.
- Shimamura, A. P., Ross, J. G., & Bennett, H. D. (2006). Memory for facial expressions: The power of a smile. *Psychonomic Bulletin & Review*, 13, 217-222.
- SPSS 17.0.1 [Computer software]. (2008). Chicago, IL: SPSS Inc.
- William, C. T. (2003). Mere exposure effects for affectively valenced stimuli. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 63, 5547.
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9, 1-27.
- Zaleski, Z. (1984). Sensation-seeking and preference for emotional visual stimuli. *Personality and Individual Differences*, 5, 609-611.
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, NJ: Erlbaum.
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. New York: Cambridge University Press.