Affective modulation of verbal fluency: Effect of anxiety and happiness

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Abstract

Previous research (Ryan & Deci, 2001) argued that well being consisted of subjective well-being and Eudaimonic well being. For this subjective well-being, Iwasaki and Kotozaki (2006) explored more objective measure of the subjective well being. They used verbal fluency as an objective measure of the subjective well being. As a result, they showed the relationship between the subjective well being and verbal fluency. In the present study, the relationship between verbal fluency and personal traits as well as subjective well-being was investigated. In addition, the influence of anxiety on the subjective well-being was also investigated. Furthermore, the effect of mood induction (neutral, happy, negative) on these relationships was explored.

Key Words : verbal fluency, mood induction, subjective well being

Many previous researches indicated that Emotion plays important role in the modulation of behavior (Kahn & Isen, 1993). Among these studies, the effect of emotion on cognitive process involved in the control of behavior was investigated. Several different experimental paradigms (e.g. search task, dot probe task) were used for exploring the influence emotion on such cognitive process in these previous studies (Eastwood, Smilek, & Merikle, 2001; Bradley, Mogg, Falla, & Hamilton, 1998; Miyazawa & Iwasaki, in press). Most of these studies investigated the influence of threatening information. In contrast, there were few studies that have explored the role of positive emotion. Thus, there is a need to investigate the effect of positive affect on the cognitive processing and control of behavior.

In a recent research on well-being, Ryan & Deci (2001) argued that there were two principal approaches for defining subjective well-being or SWB (i.e., the hedonic and eudaimonic approaches).

In the hedonic view, well being was composed of subjective happiness (subjective well being) and concerns the experience of pleasure versus displeasure. The hedonic approach focuses on happiness and defines SWB in terms of pleasure attainment and pain avoidance. In contrast, eudaimonic view defines SWB in terms of the degree with which a person is fully functioning (Ryan & Deci, 2001).

The SWB in Ryan & Deci (2001) was assessed by subjective measures (e.g. the participants reported their own the subjective well being). There was few studies that used objective measures to assess SWB. To develop an objective measure for SWB, Iwasaki and

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Kotozaki (2006) used verbal fluency which depended on the left frontal lobe.

For positive affect, Ashby, Isen, & Turken (1999) suggested that dopamine underlies the positive affect. Since dopamine was involved with left frontal area, Iwasaki and Kotozaki (2006) investigated the cognitive process involved in left frontal area as a measure of assessing the effect of dopamine on positive affect. Particularly, they used verbal fluency as a measure of objective well-being. The result of their study showed that the score of verbal fluency (especially of Letter Fluency) depended on the level of SWB. Their study suggested relationship between SWB and verbal fluency.

In addition, MaCrae & Costa (1991) suggested the relationship between SWB and personality traits (Neuroticism (N) and Extraversion (E)) from Five Factor Model.

Thus, present study examined the relationship between verbal fluency and personality traits (N and E) as well as the relationship between verbal fluency and SWB. Moreover, many previous researches showed that the effect of emotional information on cognitive processing (e.g., decision making; see Kahn & Isen, 1993). Thus, the effect of mood induction by emotional stimuli (films) on these relationships was examined in this study.

The influence of individual's anxiety level was also investigated since effect of emotional stimuli (especially threatening stimuli) on cognitive control of behavior was shown mainly for highly anxious participants (Bradley et al., 1998; Buckley, Blanchard & Hickling, 2002). Therefore, the effect of mood induction might be dependant on individual's anxiety level.

METHOD

Participants

Twenty participants ranging in age from 19 to 20 years with normal or corrected-to-normal vision were recruited from the undergraduates of the Shokei Gakuin University and were paid 1000 yen for their service. All the participants were women.

Emotional stimuli

For this study, participants were shown two sets of emotional films to induce happy, neutral, or aversive mood (one for each VF type). For happy and neutral mood induction, two video clips of comic shows (positive stimuli) and two video clips from a science education program (neutral stimuli) were produced from several TV programs. For aversive mood induction, two video clips produced from a horror film were used. These stimuli were presented for about three minutes.

These films were presented on a 17-inch liquid crystal display that was connected to an IBM compatible computer.

Questionnaire

Participants completed the NEO-FFI and PANAS in experimental procedure to assess personality trait and mood (positive and negative). Furthermore, the State Trait Anxiety

Inventory (STAI: Spielberger, 1983) was used to assess anxiety level, and the participants were asked to rate subjective well-being on a Likert scale of 1 to 3 (1. unhappy, 2. happy, 3. very happy; A rating of 1 means that participants feel happiness very slightly or did not feel happiness. A rating of 2 means that participant felt happiness moderately. A rating of 3 means that participant felt extreme happiness.).

Verbal fluency task

Verbal fluency task consisted of Letter Fluency task (L.F. task) and Category Fluency task (C.F. task). In L.F. task, participants were asked to report words (Japanese word) whose initial was "あ" or "か" or "し" as much as possible. In C.F. task, participants were asked to report words (Japanese word) that belong to one of three categories (animal, sport, occupation) as much as possible. Following the previous research (Ito, Hatta, Ito, Kogure, Watanabe, 2004), these word types were used as a response cue.

Procedure

Participants viewed the computer display from the distance of 57 cm. Participants were instructed to report words as much as possible in both L.F. task and C.F. task. The experiment consisted of two blocks with a brief break after the first block. First block included seven events: (1) Participants completed PANAS; (2) Mood induction (neutral 1) ; (3) Verbal fluency task (L.F. task or C.F. task) ; (4) Participants completed PANAS; (5) Mood induction (happy or aversive) ; (6) Verbal fluency task (L.F. task or C.F. task) ; (7) Participants completed PANAS. After the brief break, participants underwent second block. Second block included eight events: (1) Participants completed NEO-FFI (2) Participants completed PANAS; (3) Mood induction (neutral 2) ; (4) Verbal fluency task (L.F. task or C.F. task) ; (5) Participants completed PANAS; (6) Mood induction (happy or aversive) ; (7) Verbal fluency task (L.F. task or C.F. task) ; (8) Participants completed PANAS. In first block, half of participants (10) were tested in L.F. task while the other participants (10) were tested in C.F. task, and vice versa in second block.

For neutral mood induction, all participants were presented neutral film (neutral 1) in the first block, and presented another neutral film (neutral 2) in the second block. For happy and aversive mood induction, the emotional films (happy or aversive) were presented in random order within a block separately for each participant.

RESULT

The score of L.F. task after neutral mood induction (presentation of neutral film 1 and 2) and SWB were significantly and positively correlated (r = 0.477, p< .05), and the score of L.F. task and state anxiety scores from SATI were significantly and negatively correlated (r = -0.452, p< .05). For C.F. task, the score of C.F. task after neutral mood induction and state anxiety scores from STAI were significantly and negatively correlated (r = -0.452, p< .05).

No other correlation was significant.

DISCUSSION

In the present study, we investigated whether mood induction by emotional films modulate interaction between verbal fluency and personal trait, subjective well being, and anxiety. The results suggested that, when a neutral stimulus was presented, subjective well-being and state anxiety were correlated with verbal fluency. In contrast, when happy or aversive mood was induced, personal trait and subjective well-being, and anxiety were not correlated with verbal fluency.

These results indicated that happy or aversive mood induction by emotional films might decrease the influence of subjective well-being and anxiety on verbal fluency.

The result of this study showed the significant correlation between verbal fluency and subjective well being as well as verbal fluency and state anxiety when neutral stimuli was presented. However, when positive and aversive mood was induced, no significant correlation was shown.

It is possible that the emotional films elevated positive or aversive mood for all participant. As a result, difference of the level of positive or aversive mood among participants was likely to be reduced.

Additionally, there is one limitation of the present study. In this study, the possible influence of the level of individual's anxiety and subjective well being, and score of individual's personality trait was neglected. In fact, there have been many previous studies that indicated that individual's anxiety level is related to the magnitude of the influence of emotion (Mogg & Bradley, 1999; Öhman, 1996). This point must be explored in a future study.

Table1. Influence of personality trait (NEO-FFI) and subjective well being, and anxiety (state and trait) on verval fluency (L.F. task and C.F. task)

personality traitand subjective well being, and anxiety	Score of verval fluency					
	L.F. task			C.F. task		
	Neutral	Negative	Positive	Neutral	Negative	Positive
Neuroticism (N)	−.097	.087	.055	−.285	−.065	−.100
Extraversion (E)	.104	.090	.083	−.031	.170	−.103
Openness (O)	.262	.385	.029	−.043	−.215	.124
Agreeableness (A)	.012	−.257	−.353	.414	.002	.144
Conscientiousness (C)	−.044	−.166	−.036	.041	.304	.097
Subjective well being	.447*	.102	.055	.309	−.029	.268
State anxiety	−.452*	−.197	−.336	−.452*	−.387+	.007
Trait anxiety	−.288	−.082	−.159	−.252	−.193	.007

**$p<.01$, *$p<.05$, +$p<.1$.

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