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 研究課題名(和文) The role of the frontal cortex, psychological factors associated with student motivation and academic outcomes in Japanese students learning English
 研究課題名(英文) The role of the frontal cortex, psychological factors associated with student motivation and academic outcomes in Japanese students learning English
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研究成果の概要(和文)：質問紙調査は183名の参加者から、神経認知測定データの収集は75名の参加者から、fMRIデータの収集は15名の参加者から収集した。このプロジェクトから得られた結果は、論文としてまとめられ、現在、査読中である。また、このプロジェクトから得られたデータは、2021年Hawaii International Conference on Educationと2021年Annual Meeting for the Society for Neuroscienceで発表された。

研究成果の学術的意義や社会的意義

母語で情報を処理する場合と第二言語・外国語で情報を処理する場合の脳機能と感情コントロールの関係は、いまだ研究が進んでいない。本研究では、質問紙、コンピュータータスク、脳機能イメージングを用いて、母語または第二言語・外国語で感情コントロールを測定するタスクに取り組んだ際の、脳機能の潜在的な差異を検証した。その結果、感情に関する脳の領域(拡張扁桃体)は、第二言語・外国語と比較して、母語でタスクを完了した場合に、より活性化する可能性があることが示唆された。

研究成果の概要(英文)：The current research examined brain function (e.g., frontal cortex, extended amygdala, and amygdala function) associated with emotional language processing and inhibitory control using psychological surveys, neuro-cognitive measures (i.e., Go-No Go task), and fMRI scans of Japanese young adults learning English as a second language. Questionnaire surveys were collected from 183 participants, data collection for neuro-cognitive measures was obtained from 75 participants and 15 participants completed fMRI data collection. Results obtained from this project have been submitted to an international, high impact, peer reviewed scientific journal and is currently under review. Data from this project were also presented at the 2021 Hawaii International Conference on Education and at the 2021 Annual Meeting for the Society for Neuroscience.

研究分野：Experimental psychology

キーワード：prefrontal cortex amygdala extended amygdala language processing emotion inhibitory control

1. 研究開始当初の背景

Currently, there is lack of understanding regarding the underlying neural mechanisms (e.g., prefrontal cortex, amygdala, and extended amygdala function) and associated psychological factors (e.g., intrinsic motivation and anxiety) of student motivation in Japanese students learning English. This is important to understand as English language proficiency ranks low in Japan compared to other Asian countries (e.g., South Korea, Singapore) where English is not the native language (English First, 2016). In most scientific disciplines and in international business contexts English is the predominant language used to converse and write (Clarke et al. 2007; Neeley, 2012). Furthermore, the number of published papers from Japan in peer reviewed scientific journals falls below the OECD average in comparison to Japan's GDP and population (Hornyak, 2016). However, English is not required to function in daily life for most Japanese; that is, Japanese persons lack external motivators necessary to pursue English learning.

2. 研究の目的

The purpose of the study was to examine neural mechanisms (e.g., the extended amygdala and prefrontal cortex) and psychological factors that may underly motivation and emotion necessary to facilitate Japanese student motivation to learn English and thereby improve academic English outcomes in Japan.

3. 研究の方法

The research project examined brain function (e.g., frontal cortex, amygdala, extended amygdala) associated with motivation and emotion in Japanese participants learning English as a second language using functional brain imaging (i.e., fMRI), neuro-cognitive measures (i.e., an emotional-linguistic Go-No-Go task) and a psychological survey containing items assessing intrinsic motivation, identified regulation, introjected regulation, ideal L2 self, cognitive strategy use, test anxiety and self-rated English ability. Questionnaire surveys were collected from 183 participants, data collection for neuro-cognitive measures was obtained from 75 participants and 15 participants completed fMRI data collection.

4. 研究成果

Survey results found that intrinsic motivation positively predicted self-rated English ability. However, anxiety was a negative predictor of self-rated English ability. Furthermore, intrinsic motivation and anxiety positively predicted the ability of participants to self-regulate their behavior (data were presented at the Hawaii International Conference on Education, 2021). Furthermore, neurophysiological responses to positive, neutral, and negative emotional linguistic stimuli presented in participants' native language (i.e., Japanese) or in a second language (i.e., English) were examined using a modified version of an emotional Go-No-Go task and fMRI scans. Results suggest that left amygdala activation was significantly lower in the English neutral word condition compared to the

Japanese neutral word condition (see Figure 1). In addition, right extended amygdala activation was significantly lower in the English negative word condition compared to the Japanese negative word condition (see Figure 2; data were presented at the Annual Meeting for the Society for Neuroscience, 2021). These findings suggest that brain regions (i.e., the extended amygdala) associated with negative emotion are significantly less active when participants are performing a task that requires self-control and are exposed to negative emotional words in a second language compared to when they perform a self-control task and are exposed to negative emotional words in their native language. Results from this project were presented at two international scientific conferences and are currently under review in a peer reviewed international scientific journal.

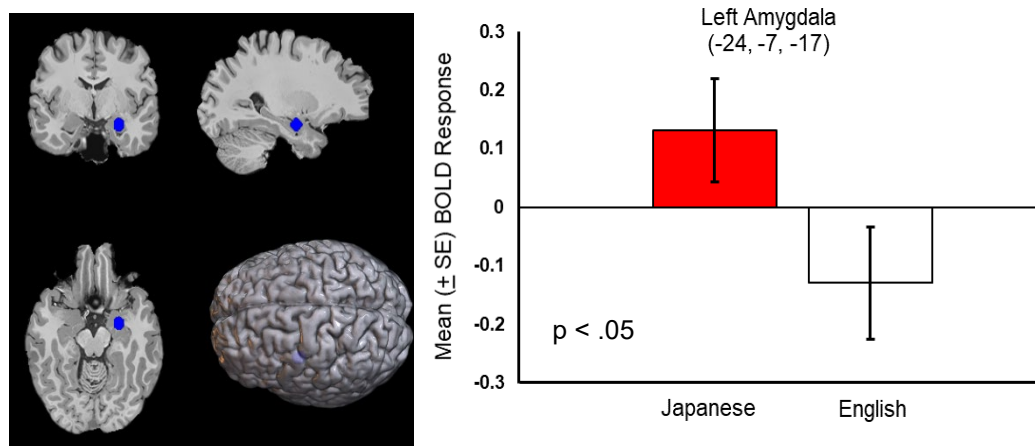


Figure 1. Mean (+ S.E.M.) BOLD responses to Japanese (red bar) or English (white bar) neutral word presentation in the inhibitory control condition (i.e., No-Go condition) measured in the left amygdala.

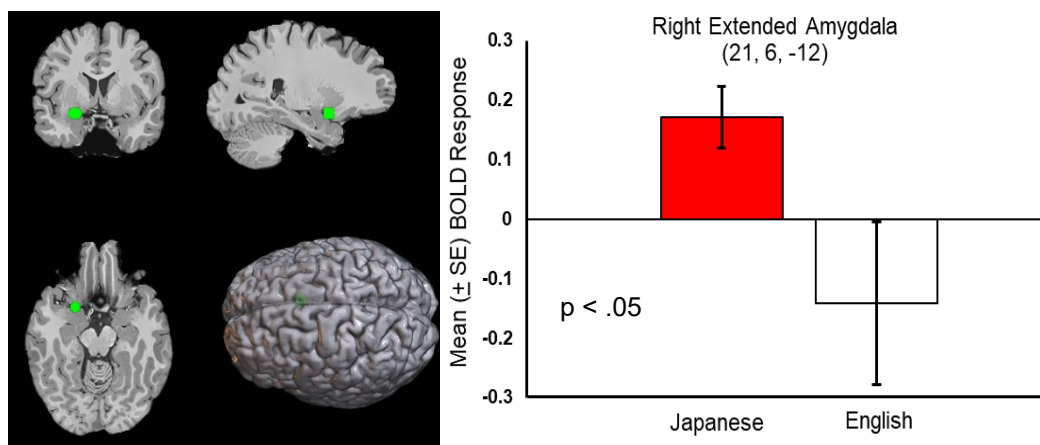


Figure 2. Mean (+ S.E.M.) BOLD responses to Japanese (red bar) or English (white bar) negative word presentation in the inhibitory control condition (i.e., No-Go condition) measured in the right extended amygdala.

<引用文献>

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5. 主な発表論文等

〔雑誌論文〕 計0件

〔学会発表〕 計3件（うち招待講演 0件 / うち国際学会 2件）

1. 発表者名 Sugita-McEown, M., Makuuchi, M., Naoe, T., Ellinger, J., and McEown, K.
2. 発表標題 An fMRI study examining the role of the extended amygdala in negative emotion and inhibitory control in second language learners.
3. 学会等名 Annual Meeting for the Society for Neuroscience (国際学会)
4. 発表年 2021年

1. 発表者名 McEown, K., Ellinger, J., and Sugita-McEown, M.
2. 発表標題 Gender differences in psychological factors as predictors of self-regulation in a Japanese learning context.
3. 学会等名 2021 Hawaii International Conference on Education (国際学会)
4. 発表年 2021年

1. 発表者名 McEown, K.
2. 発表標題 The role of the frontal cortex and psychological factors associated with motivation in predicting positive L2 outcomes among Japanese students learning English
3. 学会等名 2nd CELESE Colloquium, Waseda University
4. 発表年 2018年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

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6. 研究組織

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7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8. 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関
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