※試験場への持込
１．不可
２．可　イ．辞書
ロ．その他
（英和・和英辞典各１冊）

２０２６年度【Ｉ期】　玉川大学大学院脳科学研究科心の科学専攻
修 士 課 程 入 学 試 験 問 題

科目名	外国語（英語）	受験番号		氏名	

次の文章は，論文 **Xue, J. et al., "Detecting fake news by exploring the consistency of multimodal data." Information Processing & Management, 58(5), 2021. DOI: 10.1016/j.ipm.2021.102610** からの引用である．次の文章を読んで，以下の問いに答えよ．

Today's world is the era of self media and everyone can produce content and contribute to public opinion. Videos and images can narrate and engage readers better than text-only content. Unfortunately, these are also used by fake news. Fake news uses fictional or even fake pictures to mislead readers and spread quickly (Allcott & Gentzkow, 2017; Rubin, Conroy, Chen, & Cornwell, 2016). (1)The spread of fake news may cause massive negative effects, sometimes affecting or manipulating major public events. The 2016 United States presidential election showed the concerns of the public about the fake news influencing the citizens' impression on candidates. During the new Coronavirus (2019-nCoV), fake epidemic news spreads throughout the Internet, causing a great psychological panic among citizens. At the recent Munich Security Conference, Google released a white paper that also highlighted the need to open the Internet to combat fake news. Thus, there is an indication that research on fake news is urgent. Eliminating fake news is of great necessity for perfecting the quality of the information network ecosystem and maintaining social stability (Castillo, Mendoza, & Poblete, 2011; Qian, Gong, Sharma, & Liu, 2018; Ruchansky, Seo, & Liu, 2017; Sunstein, 2009).

As an intentional and verifiable fake news article, fake news content usually contains textual and visual information (Jin, Cao, Zhang, Zhou and Tian, 2017; Qi, Cao, Yang, Guo, & Li, 2019). (2)As shown in Fig. 1, fake news publishers often use text and image that fabricate or misrepresent facts to cater to readers' psychology which can attract and mislead readers for rapid dissemination. Generally, the topics which focus on social hot spots or controversies have intense textual descriptions on their emotional expression and visual impact on images. Fake news could come under various modes of data like texts, pictures and videos. It is a collection of multimedia which means it is hard to detect fake news from single-modal data.

Each modal data can feed rumors in different degrees. Meanwhile, fake news often uses the content like pictures or texts with highly sentiment orientation to spread quickly. However, there is not much research on how these modes affect the news. Therefore, it is necessary to integrate the multimodal features of news to detect fake news.

The present methods of fake news detection are based on either single modal data or merge two types of data (Ma et al., 2016; Ma, Gao, & Wong, 2019). These approaches ignore the effective modeling of various modalities and the similarity between multimodal data (Wang et al., 2018; Yang et al., 2018; Zhou, Wu, & Zafarani, 2020). As a result, it is impossible to deeply dig into the inherent characteristics of fake news (such as image tampering, inconsistent images, etc.). (3)What makes the text of fake news different from visual information is that some fake news (or news with low credibility) use theatrical, comical and attractive images to catch the publics' eyes, resulting in the textual content of the news being removed from the actual content. Ma et al. (2016) first included social network multimodal content that solves the problems of fake news detection by using deep neural networks. Wang et al. (2018) put forward an end-to-end event adversarial neural network based on multimodal features to detect emerging fake news events. However, these works are mainly instructive and ignore the effective modeling of visual content. The visual features used by them are mainly obtained by pre-trained convolutional neural network like VGG19, which is hard to show the intrinsic features of a fake news image due to lack of task-relevant information (Antol et al., 2015; Lin, He, Tang, & Tang, 2009). Meanwhile, these methods merged multi-modal features and ignored the similarity between news multi-modal data. The SAFE method (Zhou et al., 2020) pays attention to the similarity relationship between the image and the text. The similarity comparison module uses

a pre-trained model image2sequence to complete the conversion of the image to the text (Vinyals, Toshev, Bengio, & Erhan, 2017). Compared with an emotional text, the goal of image2sequence is more inclined to the objective statement of image content. It lacks the emotional characteristics contained in images which is important for fake news detection.

【問 1】
下線**(1),(2),(3)**をそれぞれ和訳せよ

【問 2】
なぜ著者は「**multimodal features**」や「**consistency**」の重要性を強調しているのか？　文章の内容に基づき、日本語で **300** 文字程度で根拠を説明せよ。

【問 3】
フェイクニュース検出において､テキスト情報と画像の　**consistency** に着目することは有効だと思うか？　もし他に検討すべきモダリティや特徴があるとすれば何か？　この問いに対するあなた自身の考えを **300** ワード程度の英語で述べよ。

※試験場への持込
1．不可
2．可　イ．辞書
　　ロ．その他
（辞書の種類・冊数については問わない）

２０２６年度【Ⅱ期】　玉川大学大学院脳科学研究科心の科学専攻
修 士 課 程 入 学 試 験 問 題

科目名	**外国語（英語）**	受験番号		氏名	

次の文章は, 論文 **Woo, Jieyeon, et al. "Adaptive Virtual Agent: Design and Evaluation for Real-Time Human-Agent Interaction." International Journal of Human-Computer Studies, 190, 103321, 2024. doi: 10.1016/j.ijhcs.2024.103321**　からの引用である．次の文章を読んで，以下の問いに答えよ．

We communicate by expressing our thoughts and feelings through the exchange of verbal and nonverbal signals. (1)The transfer of social signals is not only dependent on the conveying content but also on the interacting partners as we adapt to them. Adaptation is a key aspect of interpersonal relationships. It can serve to indicate our engagement and rapport, which can also elicit enhancement of involvement of others. Interlocutors adapt their behaviors throughout the interaction continuously, reciprocally, and dynamically to those of the others, referred to as reciprocal adaptation.

The reciprocal adaptation arises between interlocutors in real time following a looped process. (2)Strengthening interpersonal relationships is important in any task in which people work together. In particular, in psychotherapy, including cognitive behavior therapy (CBT), the development of rapport and the collaborative relationship between the supporter and the help-seeker has been emphasized, and their impact on treatment effectiveness has been investigated. Relationships of mutual understanding, acceptance, and sympathetic compatibility between or among individuals have been shown to contribute to the effectiveness of psychotherapy. Adaptation, both verbal and nonverbal, strengthens the relationship between supporter and help-seeker, resulting in help-seekers feeling more at ease and more likely to confront their problematic relationships and improving adherence and persistence rate with the supporter's suggestions. In medical and psychological fields, it is known that rapport affects the effectiveness of CBT. During real therapy between a patient and a therapist, health support is provided through face-to-face interactions. The therapist not only provides the therapy through verbal communication but also expresses the feeling of sympathy and engagement nonverbally with their patient.

Virtual agents interact with human users by playing the role of interlocutor. (3)Their central objective is to improve the human users' interaction experience by increasing their users' engagement level. A way to attain their goal is to adapt their behaviors depending on those of their users. For such embodied agents, they need to display continuous and adaptive behaviors in real time. Adaptive agents, adapting their verbal and/or nonverbal behavior, have demonstrated their use in increasing the user engagement, rapport, interaction synchrony, and impression of the agent. The real-time aspect of behavior generation along with the fluid dialog management needs to be assured throughout the whole interaction for both interlocutor roles of a listener and a speaker, which is not a trivial task.

The use of virtual agents can be seen in various domains ranging from assistance to healthcare. (4)Virtual agents have been demonstrated to be promising tools, notably for medical care, in gaining users' trust and acceptance. Several studies have highlighted the benefits of using virtual agents in e-health applications. As such, several conversational agents have been developed to deliver CBT focusing on the treatment. However, human supporters communicate with their help-seekers through behavior (both verbal and nonverbal) that are adapted to that of their help-seekers. It is thus important for virtual CBT agents to also communicate verbally and nonverbally, and adapt their behavior to that of their users. It is not clear from previous studies whether behaviors with reciprocal adaptation, more specifically facial expressions and head movements, have an impact on improving the effectiveness of human-agent interaction during CBT.

【問 1】
下線**(1),(2),(3),(4)**をそれぞれ和訳せよ

【問 2】
本文によれば、心理療法（とくに **CBT**）や医療・心理分野において、「サポーター（支援者）が言語的・非言語的に相手に適応すること」が重要であると考えられているのはなぜか？
本文の内容に基づき、その理由を日本語もしくは英語で説明しなさい。

【問 3】
本文では、**CBT** などの心理支援において、利用者に適応して振る舞う仮想エージェント（会話エージェント・バーチャルエージェント）の活用可能性が論じられている。
あなた自身は、こうした適応的な仮想エージェントが、人間の専門家とともにメンタルヘルス支援の一部を担うことについてどう考えるか。あなた自身の考えを **300** ワード程度の英語で述べよ。

【問 4】
本文内容に基づき、以下の文で述べられている事が正しいか、誤りかを判定し、「正」「誤」で回答せよ。

1. **Social signals are transferred only by the content of a message, not by the relationship with the interaction partner.**

2. **In psychotherapy such as CBT, rapport between the supporter and help-seeker is considered important for treatment effectiveness.**

3. **Virtual agents can easily generate real-time adaptive behaviors without any technical difficulty.**

4. **Previous studies have already proven that reciprocal adaptation of facial expressions and head movements clearly improves CBT outcomes.**

5. **Adaptive virtual agents have been shown to enhance user engagement and the impression of the agent.**

※試験場への持込
1．不可
2．可　イ．辞書
　　ロ．その他
（辞書の種類・冊数については問わない）

２０２６年度【Ⅲ期】　玉川大学大学院脳科学研究科心の科学専攻
修 士 課 程 入 学 試 験 問 題

科目名	**外国語（英語）**	受験番号		氏名	

次の文章は，論文 **Krugliak, Alexandra, and Alex Clarke. 2022. "Towards Real-World Neuroscience Using Mobile EEG and Augmented Reality." Scientific Reports 12 (1): 2291.** の **Introduction** の文章である（参考文献情報は省略）．この文章を読んで，以下の問いに答えよ．

A great deal of progress has been made in cognitive neuroscience, where imaging techniques offer a window into the mysteries of visual perception, memory, attention and language, to name a few. Such success has largely been achieved with a scientific approach where researchers seek to isolate specific cognitive functions and study their neurocognitive instantiation in a controlled manner. This is an important and fruitful approach, and will continue to be so. As cognitive neuroscience methods progress, (1)a complementary approach has also become more feasible, namely, research using more naturalistic paradigms which look towards the functioning of the human mind unleashed from controlled experiments. Moreover, experimentation beyond the lab is possible by building on the platform established by prior approaches, and by employing newer and emerging technologies to study the human brain—such as virtual reality, augmented reality and fully mobile approaches for neural recordings. Going further, combining these approaches could offer a toolkit that allows for the study of neural function in uncontrolled complex visual environments, getting us closer to studying cognition in our natural habitat. Here, we present and validate an approach to studying human cognition in naturalistic, real-world environments, while importantly retaining the ability to manipulate our key variables and retain experimental control. We achieve this by combining mobile EEG (mEEG) with head-mounted cameras and augmented reality (AR).

Mobile whole-head EEG applications have made great strides in the past decade, recently being applied to study memory, emotion, attention and movement in complex real-world settings. Advances in hardware and software have made fully mobile high-density EEG a useful tool for cognitive neuroscience, (2)however, what remains problematic is the ability to flexibly manipulate key variables, as now our cognitive variables of interest are part of the real world. For some disciplines, this could be circumvented by placing certain objects in certain places, thereby constructing experimentally useful environments. However, a more adaptable and flexible approach is to utilise immersive head-mounted displays to present virtual objects on the background of the real world, allowing for full experimental control over what people see and where those items are located. In contrast to virtual reality, where the whole environment is simulated, AR affords the ability to place 3D virtual objects in the actual environment. Recent research suggests that AR is more engaging than VR, with an indication of improved memory performance17. The ability to place a limitless set of virtual items in the real world offers a degree of experimental control that can't be matched through brute force methods. Here, we propose that by combining mobile EEG with head-mounted AR, we can study human cognition and neuroscience in real-world settings whilst also manipulating the world people see.

(3)In order to demonstrate the feasibility of such an approach, we chose to look at the face inversion effect. Typically, inverted faces produce a stronger response in low frequency power compared to upright faces. This effect is suited for our purposes as it is well defined and robust, and is therefore more likely to be observable under potentially unfavourable conditions—such as participants walking around freely while viewing virtual, but not perfectly realistic, stimuli. In our experiment, participants completed three face inversion tasks while we recorded 64-channel EEG with a mobile system. The tasks increased in technical complexity, aiming to validate the use of

mobile EEG under free moving conditions in combination with virtual 3D objects presented through a head-mounted AR device. First, a computer-based face-inversion task served as a control condition. Second, participants viewed photographs of real faces attached to the walls of a corridor. Finally, participants viewed virtual faces through the head-mounted AR device. In both the second and third task, participants were freely navigating in an indoor corridor setting, and we could contrast EEG activity for upright and inverted faces. As a follow on, we looked to establish routines whereby we could relate the dynamically unfolding visual environment to the dynamic neural signatures recorded while participants walked through natural environments. This is important, as to be able to study cognition in real-world settings, we need methods to link natural dynamic behaviour to dynamic neural signals. To achieve this, we used a GLM approach similar in nature to that used in naturalistic fMRI studies of movie watching and MEG studies of language comprehension, again testing the sensitivity of the approach against face inversion effects. Together, these twin analyses demonstrate an approach that manipulates and controls variables in conjunction with mobile neural recordings to reveal cognitive effects in dynamically changing settings.

【問 1】
下線**(1),(2),(3)**をそれぞれ和訳せよ

【問 2】
実世界を対象とした神経科学の研究を進める上で、なぜ **AR** の方が **VR** よりも優れた点があるのか？　その理由を日本語で **100〜200** 文字程度で説明せよ

【問 3】
本文内容に基づき、以下の文で述べられている事が正しいか、誤りかを判定し、「正」「誤」で回答せよ。

1. The authors acknowledge that isolating cognitive functions in controlled experiments has been a productive approach in cognitive neuroscience.

2. The authors argue that controlled laboratory experiments should be abandoned because only naturalistic paradigms are valid.

3. The Introduction states that mobile whole-head EEG has recently been used to study memory, emotion, attention, and movement in complex real-world settings.

4. According to the authors, mobile high-density EEG already allows researchers to flexibly manipulate key experimental variables in the real world without difficulty.

5. The authors propose a GLM-style approach, inspired by naturalistic fMRI/MEG work, to link dynamic behavior and environment to neural signals.