令和７年度　大学院歯学院（２次）　入学試験問題　英語

2025 English

The entrance examination to Graduate School of Dental Medicine, Hokkaido University

Question I.

Read the following article, and answer the questions.

Your answers should be written in English on the Answer Sheet I.

NEW OBESITY DEFINITION SIDELINES BMI TO FOCUS ON HEALTH

A group of 58 researchers is challenging the way obesity is defined and diagnosed, arguing that current methods fail to capture the complexity of the condition. They offer a more nuanced approach. The group's revised definition focuses on how excess body fat, a measure called adiposity, affects the body, rather than relying only on body mass index (BMI), which links a person's weight to their height.

Global problem

More than 1 billion people worldwide live with obesity, and the condition is linked to about 5 million deaths every year from disorders such as diabetes and cardiovascular disease.

Because it is easy to measure and compare, BMI has long been used as a tool to diagnose obesity. But it doesn't offer a full picture of a person's health, because it doesn't account for differences in body composition, such as muscle versus fat.

For people of European descent, obesity is typically defined by a BMI of 30 or higher, which correlates with a high level of body fat. However, a muscular athlete might be labelled obese on the basis of BMI, whereas someone with a 'normal' BMI might have excess fat that increases their risk of heart problems or other serious health issues, says Francesco Rubino, a bariatric surgeon at King's College London, who led the group proposing the new approach.

Conventional methods lead to unnecessary treatment for some people while missing others who need help, he says. To address this(1), Rubino and his colleagues propose a system for diagnosing obesity that goes beyond BMI, combining it with other methods such as measuring waist circumference, which is a proxy for adiposity, or body scans using low-level X-rays, which can directly measure fat mass.

Although there isn't a fixed threshold for obesity, body fat is typically considered to be in excess when it is above 25% in men and 30–38% in women. Because measuring adiposity directly might be impractical or costly, alternative health markers such as waist size, waist-to-hip ratio or waist-to-height ratio are important, the researchers say. However, they add, it's safe to assume that a person with a BMI above 40 has high body fat.

Diagnosing obesity should also consider the results of standard laboratory tests, medical history, and information on daily activities to assess how excess body fat might affect a person's health, says study

co-author Robert Eckel, an endocrinologist at the University of Colorado Anschutz Medical Campus in Aurora. "These are objective diagnostic criteria, they're standardized across global health systems," he says. Personalized assessments that consider age, gender and ethnicity are equally important, because certain groups might face health risks at lower BMI thresholds than others, says study co-author Louise Baur, a paediatrician at the University of Sydney, Australia.

-Source-

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Question II.

Read the following article, and answer the questions.

Your answers should be written in English on the Answer Sheet II.

Mona Lisa's ever-changing expression is one of the most enchanting aspects of Leonardo da Vinci's iconic masterpiece. The subtle ambiguity of her smile has fascinated generations of viewers and scholars, who have proposed various interpretations of this phenomenon. Some have argued that ambiguity is an intentional trompe l'oeil effect, due to a magistral manipulation of light and shadow to create an illusion of movement. Others see it as a masterful depiction of human emotional duality, simultaneously embodying happiness and melancholy, inviting endless subjective interpretations. However, none of these interpretations consider the psychological theory of perceptual organisation. This article proposes a novel interpretation based on this psychological theory. It is argued that Mona Lisa's expression is determined by the way visual features are perceptually organised. Specifically, the focus is on how the artistically crafted darkened blurred region framing the upper part of the lips, defined here as the "Ambiguity-Nuance", perceptually organizes with the mouth.

This interpretation builds upon Livingstone's account of the dynamic interplay between *melancholy* and *contentment*. [The Mona Lisa is renowned for her ambiguous smile. A noun like "smile" can lead to the hasty assumption that perceived expression is related to the happy/sad emotional continuum, as certain authors have claimed. However, Mona Lisa's expressions may not pertain to emotions but to moods. Giorgio Vasari's account of Leonardo's ploy suggests that musicians and clowns were employed to make the Mona Lisa *merry* and alleviate her *melancholy*. These adjectives refer to a state of mind, not to an externally visible expression: moods, not emotions. This aligns with Leonardo's concept of *moti mentali*, introduced in his Trattato della Pittura, which aims to represent inner thoughts and dynamic mental states rather than outward emotions. Finally, qualitative investigations suggest that the ambiguity in Mona Lisa's expression is indeed better captured by the contentment/melancholic dimension].

Livingstone suggests that scrupulous use of *sfumato* contributes to the apparent change of expression. *Sfumato* is a painting technique in which a translucent layer of paint is laid over an opaque one, generating an overlay of multiple coatings. In this way, the transitions from bright to dark, or from one colour to another, are subtle, softening, or obscure sharp edges. Livingstone interprets the effects of *sfumato* on expression change focussing on the properties of the retinal receptors. Our retina contains two types of photoreceptors: cones, gathered in the central region, which detect minute details, and rods, located in the peripheral region of the retina, which can only capture coarse aspects of visual stimuli. According to this interpretation, ambiguous expression arises from eye movements. When we direct our

gaze to Mona Lisa's mouth, the cones, capable of discerning minute details, lead us to perceive a melancholic expression. Conversely, as our gaze shifts to other areas of the painting, the rods, which capture only broad aspects of the image, register Mona Lisa's mouth without capturing its minute details—since they are blurred by *sfumato*—leading to a perception of contentment. Therefore, dynamism and ambiguity derive from a constant switch between melancholy and contentment, detected by cones and rods, respectively.

Although this interpretation brings clarity to the systematic nature of the phenomenon (it is the visible details of the mouth that determine the perceived expression, not the viewer's imagination or state of mind, Livingstone explained), it does not entirely address why melancholy is perceived when minute details are clearly visible, whereas contentment emerges when the details are unclear. There would be a dynamic effect even if contentment were detected by cones and melancholy by rods. However, this is not the case. This raises a fundamental question: Why do we perceive contentment when the details of Mona Lisa's mouth are unclear and melancholy when they are clear? Why not the other way around? The legitimacy of this question finds support in the presence of a similar expressive dynamism in other artworks attributed to Leonardo da Vinci, such as La Bella Principessa and the Young Woman with Tousled Hair or Scapigliata. Like the Mona Lisa, their expression fluctuates between contentment and melancholy. [Both masterpieces are credited to Leonardo, but not unanimously. The paternity of these artworks is irrelevant to this project. It is more relevant, instead, that their expression changes in the same way as in the Mona Lisa]. What deserves emphasis is not only that these portraits exhibit an ambiguous expression but also the consistent pattern of contentment being perceived when mouth details are unclear and melancholy when mouth details can be discerned.

-Source-

Sci Rep. 2024 May 28;14(1):12250.

Answer Sheet I

Subject English

Exam No. _____ Name _____

Question I.

1. Write down the words ①, ②, and ③ in brackets. (10%)

BMI is an abbreviation for "(①)(②)(③)".

①

②

③

2. How many people around the world are considered obese? (10%)

3. What are the disadvantages of BMI? (10%)

4. What does the underlined part (1) refer to? (10%)

5. What methods does Francesco Rubino propose to address the underlined part (1)? (10%)

Answer Sheet II

Subject English

Exam No. _____ Name _____

Question II.

Q1. What was the problem with past research in interpreting the subtle ambiguity of the Mona Lisa's smile? (10%)

Q2. What did the quantitative investigations suggest in the Mona Lisa? (10%)

Q3. What is the purpose of *Sfumato.* (10%)

Q4. What is the difference between our gaze to Mona Lisa's mouth and to other areas of the painting? (10%)

Q5. Give a suitable title based on the content. (10%)