

Guidelines for Developing and Utilizing AI Technology that Uses Brain Data to Estimate Perceptual Information. (Supplemental Material)

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Committee for Designing the Guidelines for Developing and Utilizing AI Technology that Uses
Brain Data to Estimate Perceptual Information.

This is a supplemental material for the guideline developed as a part of the commerce by the National Institute of Information and Communications Technology (NICT): "April 2021-March 2022 The Research on Ensuring Social Acceptance of AI Technologies to Estimate Perceptual Information Using Brain data" and "2023 Research for Social Implementation of Sensory Evaluation Technology in Cyber Space Using Brain Data".

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1. Characteristics and Challenges of AI Technology that Utilizes Brain data

The following are unique and specific characteristics and challenges that may arise from the use of brain data, but not from other AI fields. The followings are a definition, outline and examples.

▪ 1.1 Increase in Effectiveness

Definition: Higher effectiveness compared to existing methods based on brain data.

Example: Advertising and product design with high purchasing appeal in a way that goes beyond traditional explicit and conscious marketing methods like surveys.

▪ 1.2 Selection of appeal methods that are effective for individuals with specific brain data processing characteristics

Definition: Analyzing target consumers with specific brain data processing characteristics to garner large effects.

Example: Effective advertising and product design for individuals with specific brain data processing characteristics (including vulnerabilities) such as those who are prone to alcohol dependence, those who are prone to debt, and those who have intense insecurities (face, body shape, etc.)

▪ 1.3 Large-scale personalization

Definition: Utilization of brain data makes it possible to categorize preferences based on brain responses, enabling personalized optimization with a high degree of accuracy that was previously impossible.

Example: It is possible to estimate the brain data processing characteristics of a specific individual based on their attributes, and to precisely estimate what the target person desires and to appeal to them

▪ 1.4 Subconscious influence

Definition: to use brain data to influence the unconscious mind of the target person.

Example: Stimulate the desire to buy using expressions that consumers can notice the appeal.

▪ 1.5 Expression of the subject's inner world

Definition: In the measurement of subjects' brain data during the construction of a model of brain-mediated transfer learning, the researcher is informed of the subject's inner world, such as hobbies and preferences, whether the individual wants to or not.

Example: Even if subjects do not verbalize their preferences or express them as behaviors (e.g., browsing, clicking, purchasing, etc.), it is possible to estimate the type of preferences of individual subjects based on the characteristics of their brain data processing.

▪ 1.6 Use of illusion

Definition: Influencing consumers' subjective sensations, such as the pleasantness of a garment or the smoothness of a beverage, by using brain data without actually changing the product.

Example: In addition to physical advertisements and product changes, the use of perception by brain (illusions) to induce individuals' perceptions and motivations in a

specific direction.

- **1.7 Fostering (false) expectations through the use of "brain data"**

Definition: Creating a sense of excessive accuracy or trust through the use of the term "brain data"

Example: Creating the illusion of excessively high quality of the target product through claims such as "we use brain data to select contents".

- **1.8 Uncertainty due to developing technology**

Definition: Uncertainty of temporal changes in brain data representation and side effects of brain data use, and difficulty in promoting public understanding of false perceptions (excessive trust/expectations) and interpretations (stigma, etc.) because it is an unproven field in terms of accuracy, reliability, and validity of interpretations.

Example: Lack of a societal consensus on the technology's quality may lead to usage of products and services made with low accuracy with overtly high expectations. Exposure to messages such as "people with mental illnesses have different brain data processing characteristics" leads to excessively generalized interpretation and prejudice, even if the differences are slight.

- **1.9 High Cost**

Definition: The cost of using the technology is high.

Example: The cost of using brain data is dozens of times higher than that of conventional methods such as questionnaires.

- **1.10 Dramatic improvement in accuracy of various predictions by using brain data in the future**

Definition: In the future, the use of brain data will make it possible to predict future behaviors, states, and abilities of individuals with far greater accuracy than existing methods.

Example: Brain data will enable much higher accuracy in selecting hobbies and educational content that one favors, making users overly dependent on indicators offered by this technology.

2. Expected use case examples and considerations

For the convenience of businesses considering the use of brain-mediated transfer learning, the following information is provided for each applicable industry, as well as recommendations.

- Expected use cases: Concrete examples of expected business use
- Use Cases Requiring Consideration: Concrete examples of possible adverse effects and concerns about fairness.

▪ 2.1 Content evaluation *Media advertising, video production, etc.

2.1.1 Use Cases: Utilization in Advertising Expression

- **Expected Use Cases**
By using brain data, advertising activities (TV commercials, web advertisements, etc.) could appeal to needs that could not be obtained through conventional surveys, etc.
- **Use case requiring consideration**
 1. Improvement of purchase appeal of advertisements
 - a. Stimulate craving motivation more strongly in advertising activities for products that cause addiction symptoms, such as gambling, alcohol, and social-network games.
 - b. Increases the effectiveness of advertisements for foods and other products that are harmful to health and clearly cause diseases such as lifestyle-related diseases, thereby reducing consumers' freedom of choice.
 2. Unconscious effects on consumers without their awareness
 - a. Unconsciously construct values through advertising activities that increase gender stereotypes. (e.g., a woman alone doing housework in a messy house, or a man working excessive hours energized after drinking an energy drink)
 - b. Inducing preferences and purchasing behavior in a way that is not consciously perceived by the viewer through advertisements that influence in a way that is not consciously noticed by the user, or by customizing the advertisements that are viewed by the consumer.
 3. Unwanted expression of the subject's inner world: The consumer's tastes and preferences are revealed by viewing advertisements customized for the consumer. Tastes and preferences that the individual is unaware of may be communicated to a third party. (e.g., frequent advertisements for plastic surgery and dieting may reveal a tendency toward dysmorphophobia).
- **Recommendations**
 1. Researcher
 - a. Improvement of the purchasing appeal of advertisements
 - i. Brain data profiling of patients who are already addicted or have a tendency to be addicted has research significance, but researchers should seek expert opinions when using the data for commercial purposes.
 - ii. When using data related to individual characteristics such

as dependence, together with brain-mediated transfer learning models, ask for data provision from individuals after agreeing on the scope, purpose, and risks of such use.

- b. Influence on unconsciousness without consumer awareness: When creating brain-mediated transfer learning models only for specific attributes such as gender, etc., ensure sample diversity and promote the use of diverse models in order to avoid stereotype reinforcement and ensure inclusiveness.
- c. Unwanted internal representation: Ensure anonymity and pseudonymization of data.

2. Businesses operator

- a. Improve the purchasing appeal of advertisements
 - i. When dealing with commercial products that are addictive, consider whether the results of brain AI analysis can be used to exacerbate the craving.
 - ii. A third-party ethics committee established by each business should be involved in decision-making for advertising activities for products that are harmful to health.
- b. Influence on unconsciousness
 - i. When using brain-mediated transfer learning models of specific attributes such as a specific gender, institutionalize measures at the planning stage to prevent the risk of stereotyping by the advertising expression.
 - ii. Be mindful when using stimuli that cannot be consciously perceived (unconsciously processed by the brain) in advertisements and services.

2.1.2 Use Case: Optimization of Advertising Expression According to Individual Characteristics Using Brain data

- **Expected Use Cases**

Optimization of advertisements that resonate with specific target groups and images with expressions that do not trigger adverse reactions from certain minorities, including trauma, aversion, or craving.
- **Use Cases Requiring Consideration**
 - 1. Selection of appeal methods that are effective for individuals with specific brain data processing characteristics, and improvement of the purchasing appeal of advertisements
 - a. Maximization of expressions that incentivize purchases by excessively evoking insecurities related to personal appearance, such as body shape, using brain science and inciting feelings of insecurity and inferiority.
 - b. Selection of expressions that encourage discrimination to direct products toward or avoid certain groups of people, such as promoting consumer finance products by inciting frustration and yearning among those with financial disadvantages.
- **Recommendations**
 - 1. Researcher
 - Selection of appeal methods that are effective for individuals with specific

brain data processing characteristics and improvement of the purchasing appeal of advertisements: When profiling specific psychiatric symptoms, be mindful to ensure that the results are not linked to excessive purchasing behavior attraction, etc.

2. Businesses operator

Selection of effective marketing methods for individuals with specific brain data processing characteristics and improvement of the purchasing appeal of advertisements: Do not conduct profiling that exacerbates specific psychiatric symptoms or marketing targeted specifically to patients with psychiatric symptoms (e.g., eating disorders, dysmorphophobia, etc.).

2.1.3 Use Case: Encouraging voting by nurturing pro-social and pro-environmental behavior and voter awareness

▪ **Expected Use Cases**

The technology may improve the effectiveness of highly socially relevant public advertising content, and to help solve social issues currently being promoted in the international community, such as ESG/SDGs.

▪ **Use Cases Requiring Consideration**

1. Improving the appeal of public activities

a. Calls for participation in activities that violate social values, including democracy, fundamental human rights, freedom of speech and expression, and law and order.

b. Advertising activities aimed at demotivating the attitudes of viewers, even if not explicitly expressed (political use of the chilling effect).

2. Effects on the unconscious: Advertisements that appeal to specific perceptions and lead to activities related to ideologies and beliefs (support for a specific political party, etc.), without the viewer being aware of it.

▪ **Recommendations**

1. Researcher

a. Effects on the unconscious

b. Third-party ethical judgment should be imposed before analyzing specific ideologies and beliefs and reactivity (vulnerability) to advertising expressions using brain data.

2. Businesses operator

a. Improving the appeal of public activities

b. One should not use the technology for advertising or products aimed at inciting activities that violate social values, including democracy, fundamental human rights, freedom of speech and expression, and law and order

c. Effects on the unconscious: One should not use brain data to appeal to specific values regarding ideology and beliefs.

▪ **2.2 Product evaluation (excluding healthcare industry) *Daily necessities, beverages, automobiles, travel, construction, materials, etc.**

2.2.1 Use case: Improve product characteristics (e.g., user experience)

▪ **Expected Use Cases**

There may be improvements in a variety of products, including increased comfort

levels in cars, clothing materials, homes offices, more thirst-quenching beverages, more attractive packaging, interior and exterior design of cars and homes, and acoustic environment design, as well as better analysis of hit songs.

- **Use Cases Requiring Consideration**
 1. Use of illusions and improvement of purchase appeal
 - a. Designing flavors that make highly alcoholic beverages easier to drink and cigarettes more pleasant to smoke.
 - b. Making it easier to eat foods and other products that have been shown to be harmful to health.
 2. Use of unconscious influences and illusions
 - a. Office design to limit fatigue even after hours of overwork (e.g., short-wavelength light control to increase alertness even at night)

- **Recommendations**
 1. Researcher
 - a. Use of unconscious influences and illusions: While there is research significance in brain data profiling of patients who are already addicted or who have a tendency to become addicted, one should seek expert opinions for commercial use.
 2. Businesses operator
 - a. Increase of the purchase appeal
 - i. When dealing with commercial products that carry a risk of dependence, consider the impact on vulnerable subjects and prepare for the risk and countermeasures.
 - ii. A decision by a third-party ethics committee established by each business is required for products subject to brain AI utilization.
 - b. Use of unconscious influences and illusions: One should conduct a risk analysis of side-effects, its evaluation and countermeasures when utilizing the technology for environmental intervention.

2.2.2 Use Case: Personalized (specialized for targeted consumers) product development

- **Expected Use Cases**

The technology may enable product development targeted to specific consumers.

- **Use Cases Requiring Consideration**
 1. Social discrimination through large-scale personalization: only products that are optimized for certain customer segments (e.g., cooking and cleaning utensils that men find difficult to use because they were specialized for housewives, or sports and outdoor equipment that women find difficult to use because they were specialized for men who like sports).
 2. Reduced freedom of choice through large-scale personalization: over-optimization of preferences based on brain data may deprive people of serendipity, force them to buy things beyond their needs, and impose financial burdens.

- **Recommendations**
 1. Researcher
 - a. Social discrimination through large-scale personalization: ensure sample diversity. Use a variety of models.

- b. Reduction of freedom of choice due to large-scale personalization: Specify the possibility that the information may be used to personalize products for others using the person's attributes, etc.
- 2. Businesses operator
 - a. Social discrimination through large-scale personalization: fulfill the obligation to take discrimination into account when using individual brain models aimed at specific demographics (calculation of risk and recommended countermeasures).
 - b. Reduction of freedom of choice due to large-scale personalization: Be mindful not to restrict consumer behavior through over-optimization.
 - c. Fostering false expectations: It is not desirable to falsely increase the expectations on reliability of products among consumers by using phrases such as "products based on brain science and brain data analysis." One should utilize expressions that are in line with actual conditions, such as "brain data is used as one feature in product development.

2.2.3 Use Case: Use of evaluations of pain, discomfort, worsening of usability, etc. for product safety technology

- **Expected Use Cases**

Potential applications include preventing excessive acceleration of a mobile vehicle and one-handed driving caused by the uneasy feel on the accelerator and the steering wheel, respectively. On the other hand, there is a risk of causing pain and discomfort to consumers, so special care should be taken for the use cases listed below.

- **Use Cases Requiring Consideration**

1. Undermining consumer utility: use of brain data to incentivize purchases of products that compromises the consumer utility. For example, designing houses that are uncomfortable to live in to receive renovation costs, designing stores that are uncomfortable at the request of their competitors, etc.
2. Fostering craving due to decreased satisfaction: Reduced satisfaction from consumer products that are harmful to health and addictive, such as alcohol and cigarettes, may incentivize more consumption, harming consumer's health.

- **Recommendations**

1. Researcher
 - a. Seek expert opinion when commercial use is intended to undermine consumer utility.
2. Businesses operator
 - a. Undermining consumer utility: One should not utilize brain data for the purpose of disadvantaging consumers or intentionally interfering with the business of others.
 - b. Fostering a sense of craving: One should consider the possibility of exacerbating adverse health effects.

- **2.3 Consideration for ELSI in industries that are not currently envisioned for use but**

will have applications in the future

2.3.1 Use Case : Education Industry Improvement of Educational Content

- **Expected Use Cases**

Future use may include the creation and selection of educational materials that enhance concentration and learning.

- **Use Cases Requiring Consideration**

1. Fostering false expectations: Inaccuracies in brain data typologies may result in learners receiving materials that are not suited for them. For example, appropriate materials may not be provided if there was secondary transference to children's data using adult models.)
2. Improved product purchase appeal: There is a risk of reduced diversity in learning methods.
3. If materials become more expensive, it may limit users that can access them, widening educational disparities.

- **Recommendations**

1. Researchers
 - a. Make efforts to communicate scientifically valid interpretations and limitations of the data.
2. Businesses operator
 - a. Disclose accuracy and risk to consumers when recommending content that utilized brain-mediated transfer learning models to prevent the rise of false expectations in its efficacy.
 - b. Accessibility considerations: ensure broad accessibility of publicly beneficial items).

2.3.2 Use Case: Health Care Industry: Health Promotion

- **Expected Use Cases**

The potential applications include promotion of healthy dieting using food that can trigger a sense of satisfaction with a small amount and development of content that prevent the decline of cognitive functions. Another possible application is to create a brain-mediated transfer learning model prior to the onset of dementia to use it to improve the quality of nursing care services when dementia complicates communication.

- **Use Cases Requiring Consideration**

1. Use of illusion: Food that provide satisfaction in small amounts may encourage unhealthy dieting, resulting in users falling short on necessary nutrition.
2. High price: Services to prevent cognitive decline (dementia prevention) may become unaffordable for many.

- **Recommendations**

1. Researcher
 - a. Use of illusions: Seek expert opinion when using the technology in commercial cases where there are health risks.
2. Businesses Operator
 - a. Use of illusions: Consider how the application of the technology may increase health risks of the product or services (obligation to evaluate and take measures).

- b. Consideration for accessibility: Ensure accessibility of publicly beneficial items, such as medical devices.

2.3.3 Use Case: Medical Industry for Mental and Neurological Disorders: Improving Mental Health through illness Prediction

- **Expected Use Cases**

The technology may enable detection of specific mental/neurological disorders based on response patterns to videos (e.g., predicting depression or schizophrenia based on cognitive distortions, etc.). In addition, brain-mediated transfer learning models constructed prior to the onset of dementia may be able to predict its onset.

- **Use Cases Requiring Consideration**

1. Uncertainty due to the fact technology is still developing
 - a. Perversion and diffusion of misinformation regarding characteristics of the brain data expressions related to mental illness (e.g., "schizophrenics are scary because they see X in Y"). The underdeveloped state of the technology increases the risk of such stigmatization.

- **Recommendations**

1. Researchers: Make efforts to communicate scientifically valid interpretations and limitations of data.
2. Businesses Operator: Be mindful of any impact on stigma promotion, etc.

2.3.4 Use Case: Dual use etc. (Related to national security)

- **Expected Use Cases**

The technology may be able to ameliorate damages to the brain caused by conflicts (healing illness from individuals traumatized by conflicts) etc.

- **Use Cases Requiring Consideration**

1. Manipulation and induction: Creation of propaganda for one's country and/or the enemy as a cognitive warfare technique.
2. Inhumane human body modification: Creation of programs that eliminate fear from soldiers to optimize them for combat.

- **Recommendations**

1. Researcher
Due consideration will be given to the use of the information for security-related technologies, etc.

2.3.5 Use Case: Use in criminal investigations

- **Assumed Use Cases**

The use of brain data (and brain-informed AI) for criminal investigations was an item that garnered enthusiasm at the 2007 "Public Awareness of Brain Science."¹

While many believe it is acceptable, the application of neuroscientific findings to criminal investigations and crime preventions is a contested topic that warrant

¹ <https://www8.cao.go.jp/cstp/tyousakai/life/haihu52/sirvo4-3.pdf>

careful considerations.²

- **Use Cases Requiring Consideration**
 1. Crime investigation: Evaluate the perceptual characteristics of a crime scene using brain-mediated transfer learning.
 2. Crime prediction: Predicting crime rates, etc., based on specific perceptual characteristics using brain-mediated transfer learning.
- **Recommendations**
 1. Researcher
Due consideration will be given to the use of this information in criminal investigations, etc.

3. Existing relevant guidelines, etc.

We aim to create guidelines for the unique issues that arise from the use of brain data. However, in using brain-informed AI, one may encounter many issues that are covered by existing AI-related guidelines and various guidelines for using brain data. This section provides information on such existing guidelines.

▪ 3.1 Existing AI-related guidelines

3.1.1 Overseas

- The Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonized Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts (2021.4, European Commission)³

A policy package on AI presented in 2021. It aims to develop an ecosystem of trust by proposing a legal framework for trustworthy AI. It also responds to calls repeatedly expressed by the European Parliament and the European Council for legislative measures to ensure an internal market for well-functioning AI systems; to respect existing legislation on the safety and fundamental rights of people while AI systems develop; and to ensure legal certainty to promote investment and innovation in AI. It emphasizes the protection of individual liberties and rights over the improvement of AI technology and performance. The framework categorizes AI into four categories: unacceptable AI, high-risk AI, AI with transparency obligations, and minimal risk/no risk AI, with the availability and conditions of use set accordingly. The Ethics Guidelines for Trustworthy AI⁴ presented by the High-Level Expert Group on AI in 2019 built foundations of this document.
- AI Act: a step closer to the first rules on Artificial Intelligence (2023. 5, European Parliament)⁵

In response to the rapid evolution and spread of generative AI, additional requirements have been included in the 2021 Draft European AI Regulation. AI

² <https://www.jst.go.jp/erato/ikegava/elsi/survey-report.pdf>

³ <https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence>

⁴ <https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>

⁵ https://www.europarl.europa.eu/news/en/press-room/20230505IPR84904/ai-act-a-step-closer-to-the-first-rules-on-artificial-intelligence?_ga=2.259581386.1109479637.1703582336-1531281714.1703582335&_fsrc=ymEM8E8y

is categorized by characteristics, and regulations are applied according to risk level. As with other European regulations, AI provided by companies outside the region that are relevant to the European market will also be subject to the regulation, and fines will be imposed on a worldwide sales basis in the event of non-compliance. The regulation is currently under negotiation by both legislative bodies and will not come into effect until 2024 or later.

- The National Artificial Intelligence Initiative Act of 2020 (2021.1, United States of America)⁶
The purpose of this act is to ensure continued U.S. leadership in AI research and development; to be a world leader in the development and use of reliable AI systems in the public and private sectors; to prepare for the integration of AI systems into all sectors of the economy and society; and to coordinate ongoing AI research, development, and demonstration among civilian agencies, the Department of Defense, and intelligence agencies. The objectives of the program are to coordinate ongoing AI research, development, and demonstration; provide continuous and consistent support for AI research and development, including through grants; support education for building, using, and interacting with AI systems; and support research, education, and workforce development programs for students and researchers. For additional insights on American takes on the Artificial Intelligence, consult “Blueprint for an AI Bill of Rights”⁷
- Draft "AI Bill of Rights" (2022.10 US, White House Office of Science and Technology Policy)
Five principles are set forth for consideration in AI development and elsewhere; safe and effective systems, protection from algorithmic discrimination, data privacy, notice and explanation, and human alternatives, considerations, and preliminary measures. The draft is unique in that it not only addresses issues such as privacy, which have been discussed in the past, but also largely addresses the issue of algorithmic discrimination. In fact, in May of the same year, the U.S. Equal Employment Opportunity Commission published a manual outlining the issues to be considered when evaluating the job performance of job applicants with disabilities and other employees using AI and other algorithms, showing a proactive approach to derive a solution to the problem of discriminatory bias in AI from a practical level.
- AI Principles (OECD, 2019.5)
The OECD Ministerial Council adopted new OECD Principles on Artificial Intelligence on May 22, 2019. The advisory identifies five mutually complementary value-based principles for responsible stewardship of credible AI and calls on AI stakeholders to promote and fulfill them.
 1. Inclusive growth, sustainable development and well-being
 2. Human-centered values and equity
 3. Transparency and responsible disclosure
 4. Robustness, security and safety
 5. Accountability

The advisory also provides policymakers with five recommendations for national policies and international cooperation for credible AI that are in addition to and

⁶ [The National Artificial Intelligence Initiative \(NAI\) National Artificial Intelligence Initiative](#)

⁷ <https://www.whitehouse.gov/ostp/ai-bill-of-rights/>

consistent with these value-based principles.

1. Investment in AI research and development
2. Organization of digital ecosystems for AI
3. Formation of the policy environment to promote deployment of trustworthy AI systems
4. Human resource development and preparation for changes in the labor market
5. International cooperation for reliable AI

3.1.2 Domestic

- Social Principles of Human-Centric AI (2019.3, Cabinet Office)⁸

The principles are divided into "Social Principles for AI " which society (especially legislative and administrative bodies such as the national government) should pay attention to in order for AI to be accepted and properly used in society, and "Principles for AI Development and Use," which developers and business operators engaged in AI research and development and its social implementation should pay attention to. The AI social principles include the principles of human-centeredness, education and literacy, privacy, security, fair competition, fairness, accountability, and transparency and innovation. (The Government has established the Guidelines for AI Utilization and the Governance Guidelines for the Implementation of the AI Principles to implement the principles set in this document.)
- Guidelines for AI Utilization (2019.8, Ministry of Internal Affairs and Communications)⁹

The objective is to promote the utilization and social implementation of AI by promoting the benefits of AI, controlling its risks and fostering trust in AI through the healthy development of AI network. It provides guidelines on information sharing with stakeholders during utilization, security, etc. It lists 10 items that users of AI should keep in mind.

 1. Principle of Appropriate Use
 2. Principle of Appropriate Learning
 3. Principle of Collaboration
 4. Principle of Safety
 5. Principle of Security
 6. Principle of Privacy
 7. Principle of Dignity and Autonomy
 8. Principle of Equity
 9. Principle of Transparency
 10. Principle of Accountability
- Governance Guidelines for Implementation of AI Principles (ver. 1.0)" (2021.7, METI)¹⁰

Guidelines that present action goals to be implemented by AI providers to support the implementation of the AI Principles necessary to promote its social implementation. The aims of the document are to be widely referred to in transactions among businesses involved in the development and operation of AI systems, etc., and to encourage voluntary efforts by each company through the

⁸ [人間中心の AI 社会原則 \(案\) \(cao.go.jp\)](https://cao.go.jp/)

⁹ [000809595.pdf \(soumu.go.jp\)](https://soumu.go.jp/)

¹⁰ [20210709_6.pdf \(meti.go.jp\)](https://meti.go.jp/)

formation of a common understanding among stakeholders regarding the implementation of the AI Principles.

▪ 3.2 Guidelines for Brain data Utilization Technology (Brain data Utilization Technology)

3.2.1 Overseas

- “Responsible innovation in neurotechnology enterprises” (The OECD Directorate for Science, Technology and Innovation (STI), 2019.10) ¹¹.

OECD Directorate for Science, Technology and Innovation published a report on recommendations for the social implementation of neurotechnology. The main issues (recommendations) are as follows

1. It is time to re-think governance of neurotechnology.
2. Stakeholders in the public and private sector are looking for guidance.
3. The private sector has an important role in the development of responsible innovation practices in global markets.
4. An explicit commitment to principles of responsible development upstream can promote the trust and trustworthiness that are crucial for success.
5. Tools and approaches for responsible governance of neurotechnology are emerging.
6. Sound regulation is key to enable robust innovation trajectories
7. Standards are critical.
8. There are large potential gains to be derived from data sharing.
9. Public deliberation can contribute directly to value creation.
10. Investors play a key role in enabling responsible innovation.
11. There would be utility in developing a set of international.

- Principles Neurotechnologies and Human Rights Framework: Do We Need New Rights? " (2021.11, European Conference) ¹²

This was the topic of a symposium at the European Conference and the OECD. Recommendations on responsible innovation in neurotechnology were presented. The main issues (recommendations) are as follows

1. Promote responsible innovation in neurotechnology to address health challenges.
2. Prioritize the evaluation of safety in the development and use of neurotechnology.
3. Promote inclusiveness of neurotechnology for health.
4. Fostering scientific collaboration in neurotechnology innovation across countries, sectors, and disciplines.
5. Enable social reflection on neurotechnology.
6. Enhance the capacity of regulatory and advisory bodies to address emerging issues in neurotechnology.
7. Protect personal brain data and other information obtained through neurotechnology.
8. Promote a culture of stewardship and trust in neurotechnology in the public and private sectors.

¹¹ Garden, H., et al. (2019), "Responsible innovation in neurotechnology enterprises", OECD Science, Technology and Industry Working Papers, No. 2019/05, OECD Publishing, Paris, <https://doi.org/10.1787/9685e4fd-en>.

¹² [Neurotechnologies and Human Rights Framework: do we need new rights? - Human Rights and Biomedicine \(coe.int\)](#)

9. Anticipate and monitor the potential for unintended use and misuse of neurotechnology.

- Data for Good: Rafael Yuste on the Ethical Development of Neurotechnology (2020.3, Columbia University) ¹³

The main issues discussed are as follows

1. The right to personal identity
2. Right to free will
3. Right to mental privacy
4. Right to equal access to mental augmentation
5. The right to protection from algorithmic bias

- IEEE Neuroethics Framework (2021, Brain Neuroethics Subcommittee, Institute of Electrical and Electronics Engineers)¹⁴

The committee is developing a framework for assessing the ethical, legal, social, and cultural issues that may arise with the development of neurotechnology. The goal is to provide guidelines for the use of neuro technology by applications (medical, wellness, education, jobs/employment, military, entertainment, sports, and legal systems).

- Summary of Reports (Gray Matters, vol. 1& 2) from Brain Research through Advancing Innovative Neurotechnologies Initiative (Vol. 1: 2014, Vol. 2: 2015, United States).¹⁵

The reports are culminations of the work done by the U.S. Bioethics Advisory Commission in reviewing ethical considerations for the conduct of neuroscience research and the application of research results, mandated by the Initiative. Vol. 1 emphasizes the importance of integrating ethics and neuroscience. It provides practical, conceptual, and methodological tools that funders, scientists, and other stakeholders can apply directly to neuroscience research. vol. 2 addresses in detail three topics that are at the intersection of neuroscience and society and have received public attention: cognitive enhancement, capacity to consent, and neuroscience and the legal system.

- "Ethics of Neurotechnology" (2023,7,13 UNESCO) ¹⁶

The following issues were raised as problems of neurotechnology

1. The integrity of the brain and psyche and human dignity
2. Personal identity
3. Freedom of thought, freedom of cognition, and free will
4. Mental privacy and confidentiality of brain data

The conference concluded that the use of neurotechnology requires a comprehensive governance framework, specifically the development of global normative instruments and ethical frameworks exemplified by UNESCO's Recommendations on the Ethics of Artificial Intelligence. It was also emphasized that the use of ethics as a guiding principle for managing neurotechnology is essential to ensure privacy, transparency, fairness, and equity.

- Virtual Workshop "Neurotechnology's in and for Society: deliberation, stewardship and trust (2021.5, OECD Nano- and Converging Technologies

¹³ [Data for Good: Rafael Yuste on the Ethical Development of Neurotechnology | Columbia Science Commits](#)

¹⁴ [Brain-neuroethics-flyer-intro_v8.indd \(ieee.org\)](#)

¹⁵ <https://elsi.osaka-u.ac.jp/research/820>

¹⁶ [Ethics of Neurotechnology: UNESCO, leaders and top experts call for solid governance | UNESCO](#)

(BNCT))

Workshop aimed at implementing the OECD Recommendations adopted in 2019, with a focus on Principle 5: Enabling societal deliberation on neurotechnology and Principle 8: Promoting cultures of stewardship and trust across the public and private sector.

The main issues discussed were

1. When and how to appropriately regulate neurotechnology
2. How to gain the trust of the public
3. The need for cooperation and joint responsibility across the public and private sectors

3.2.2 Domestic

A guidebook/evidence book is being prepared as part of the R&D project "Liberation from Biological Limitations via Physical, Cognitive and Perceptual Augmentation " under Moonshot Goal 1 "Realization of a society in which human beings can be free from limitations of body, brain, space, and time by 2050" " in the Cabinet Office Moonshot-type R&D Program.

- The Brain Tech Guidebook (2022.10, Brain Tech Guidebook Development Committee)

Intended for those interested in brain tech products, the guidebook provides definitions of "brain tech," "neurofeedback," and "neuromodulation," as well as a summary of risks, ethical issues, and other considerations in developing and purchasing brain tech products.

▪ 3.3 Existing guidelines for advertising

The following are ethical guidelines for advertising that are voluntarily prepared and operated by private entities such as the advertising industry in the areas addressed by these guidelines.

Advertising Ethics and Self-Regulation

Involved parties	Contents	Regulatory details
Common to the Advertising Industry	Regulatory Compliance in General Advertising	"Code of Ethics for Advertising", Japan Advertising Agencies Association. "Code of Ethics for ACC and Commercials", All Japan Confederation of Creativity. "Advertising Code of Ethics", BtoB Association Japan.
Advertisers	Compliance with regulations regarding the planning and implementation of advertising strategies	"JAA Code of Ethics", Japan Advertisers Association. Other self-regulations of each industry and each company
Advertising Companies	Compliance with regulations regarding advertising planning, media planning, and advertising production	"Advertising Code of Ethics" and "Creative Code", Japan Advertising Agencies Association, and other self-imposed regulations of each company
Advertising media	Decide whether or not to	"Newspaper Advertising Code of

companies	publish, broadcast, etc.	<p>Ethics", "Newspaper Advertising Standards" and "Newspaper Advertising Standards", the Japan Newspaper Publishers & Editors Association.</p> <p>"Magazine Advertising Code of Ethics" and "Magazine Advertising Standards, Japan Magazine Advertising Association.</p> <p>"Broadcasting Standards", Japan Commercial Broadcasters Association.</p> <p>"Outdoor Advertising Charter", the Tokyo Outdoor Advertising Association.</p> <p>"Advertising Code of Ethics", Japan Internet Advertising Association</p> <p>Other self-imposed regulations by media companies.</p>
Advertising Review Organizations	Pre- or post-advertisement review	<p>Handling of complaints and inquiries regarding advertisements at the Japan Advertising Review Organization.</p> <p>Preliminary review of ads by the Newspaper Advertisements Review Council.</p>

(Japan Advertising Review Organization (JARO)) <https://www.jaro.or.jp/jaro30/pdf/1-4.pdf>

Appendix : Consent form sample

Brain data Provider Consent Form

I have been fully informed about the experiment and the provision of brain data as described in the following section. I agree to participate in this experiment as a subject, as I see no particular obstacles.

Date / /

Address
Name
Signature

1. Research title

Research and development of brain-mediated transfer learning model construction

2. Researchers in charge

3. Procedure of experiments and brain data collection (objective and method)

Objective: To collect information on brain activity in response to products, advertisements, etc., and conduct brain activity measurement experiments to construct a brain-mediated transfer learning model.

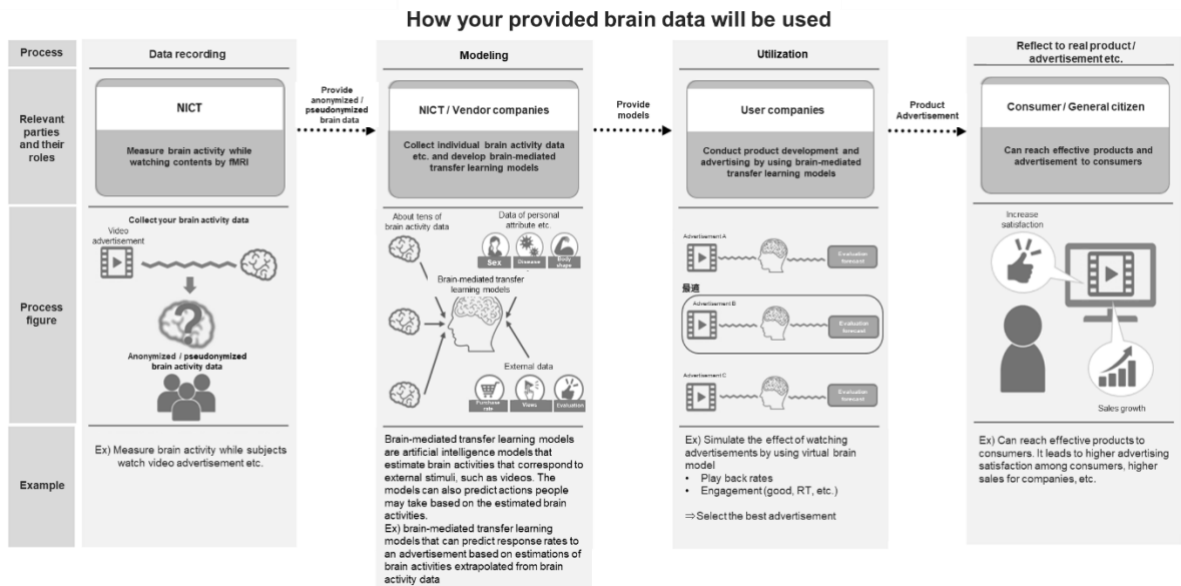
Method: We will present external stimuli such as video, audio, products, and advertisements, and measure the brain activity (using fMRI) during the stimuli presentation.

4. Contents and use of brain data to be provided

We will measure brain activity during the presentation of multiple stimuli such as video, audio, products, advertisements, etc. Please be sure to read the attached advance instructions for precautions regarding the measurement equipment. The stimuli to be presented to each participant and the specific experimental tasks to be performed will be explained individually.

In addition, general demographics such as age, as well as information about your characteristics that you agree to provide, may be combined with the brain data for analysis.

Please refer to the figure below for how we will use the brain data you provide in this experiment. Since brain-mediated transfer learning brain-mediated transfer learning technology has not perfected yet, and research and development are being conducted in parallel with the technological advancement, there are uncertain aspects of risk that are difficult to predict. Therefore, we will comprehensively monitor the brain data provided to us at the time of AI development, use (whether the data is appropriately used), and afterwards (whether there are any adverse effects). If any inappropriate cases are found, we will disclose the information promptly.



5. Experiment duration

XXX

6. Disadvantages and risks to subjects arising from the experiment

(1) MRI system uses a high magnetic field, which has a risk that magnetic substances inside or outside the body may cause lacerations or burns. Hence, prior to the experiment, we will screen for the presence of magnetic substances in the body and thoroughly inform the participants of the prohibition of bringing magnetic substances into the experimental room. In addition, we anticipate psychological stress due to the closed environment (inside the MRI magnet) and prolonged restrained (maximum restraint time of approximately 2 hours). However, we will inform subjects that they have the right to refuse continuation of the experiment on their own, ensure constant verbal communication with them during the experiment, and keep the emergency stop system available at all times during the experiment. During the experiments other than fMRI tasks, the subjects should be informed that they have the right to refuse continuation of the experiment, and we will ensure constant verbal communication with them during the experiment.

(2) When using wide-field 3D images, there is a possibility that visually induced motion sickness or other discomforts may occur depending on the stimulus conditions and the subjects. We will inform them that they have the right to refuse continuation of the experiment, and ensure constant verbal communication with them during the experiment so that we can terminate the experiment at any time.

(3) The researcher will always pay attention to the subject's physical fatigue during the experiment, and will ask the subjects their conditions between tasks. If a subject reports fatigue, the researcher will take a break and ask for the subject's opinion regarding the continuation of the experiment.

7. Privacy considerations

We will not disclose the data obtained in the experiment without your consent. We will also handle the data in consideration of your human rights.

8. Your freedom to refuse the experiment

You have the right to terminate the experiment at any time at your own discretion after the experiment begun, and you may withdraw your consent. You can also withdraw your consent after the experiment is completed to stop the further use of your data. However, once your brain data is analyzed to construct an AI model, it is difficult to completely eliminate the influence of your brain data on the constructed model. Therefore, once you have provided your brain data, it is impossible to delete “models that used a part of your data” and “your data as a part of the constructed model”. Please keep this in mind.