COPYRIGHT CHALLENGES WITH REGARD TO BRAIN-COMPUTER INTERFACE

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ABSTRACT

Neuralink and other brain-computer interfaces (BCIs) convert raw neural activity into artistic works, which raises basic copyright questions. BCIs are not only able to navigate the neural signals of a user's mental activity but they convert this neural input into drivable, tangible and artistic work, such as text, music, or digital art. When creative works are generated via the BCI, copyright issues arise as to who can lay claim to be the rightful copyright holder of this work that has been produced with a BCI - the individual that provided the neural input, the person that produced the interacting algorithms, the person that produced the hardware and software or some combination of the two or more individuals. This study aims to elucidate the question of who should be determined the rightful copyright owner of BCI-produced works and to bridge the gap between the complex realm of neurotechnology and principles of copyright for the purpose of future legal and technological considerations using a doctrinal framework. The research monitors copyright across jurisdictions including the US, UK and focuses specifically on copyright in India in which a strong base connects with multi-party copyright allocations. The outcome of the research will consider published legal reform and legislative reforms to embrace these new hybrid forms of creative production and propose models for equitable ownership among users and creators which takes into account the responsibilities of both, users and creators. As human-machine mediation defines the future of creative expression, this research argues that there is merit in striking a balance between the rights of developers and user agency, while advancing the conversation around intellectual property in an era of neurotechnology.

Keywords: Neuralink, Brain- Computer Interface, Copyright, Multi-party ownership, neurotechnology

INTRODUCTION

Neuronal Interface systems are one such technologies which is becoming the reality. Its application is vast and the potential outcomes result in various positive as well negative impacts on the society. This technology works as a communication interface between the brain with a external machine. They are programmed to assist, map, research event to repair human sensory motor functions. The methodologies used by these technologies range from non-invasive to partially invasive and also certain invasive techniques such as electroencephalography to electrocorticography. The scope of these devices can be for expressive works.

Copyright law on the other hand protects the moment the work is created in a fixed and tangible medium as according to Section 3(2) of the UK Act 1988. Copyright is concerned with ideas of work which are expressed on a tangible form.

This research involves the question of who should be recognized as the copyright owner of BCI generated works as three parties are involved in such works- the developer of the BCI hardware as well as software, the user whose neuro signals are transformed or the creator of the interpreting algorithm or some combination thereof. The reason for addressing such issues which also serve as the significance of the research is because the fundamental principles of copyright such as originality and fixation comes into question.

A fascinating application of this technology can be seen in Elon Musk's Neuralink launched an implantable brain-computer interface which can turn thought s into text. This would help patients suffering from stroke and spinal injury.

Neuralink in its privacy policy as stated that the information collected even through its products can be used to conduct product improvement activities or research activities. Creative works thus generated from this brain implanted chip shall be protected as to the rightful owner to claim copyrights.

This research involves the question of who should be recognized as the copyright owner of BCI generated works as three parties are involved in such works- the developer of the BCI hardware as well as software, the user whose neuro signals are transformed or the creator of the interpreting algorithm or some combination thereof. The reason for addressing such issues

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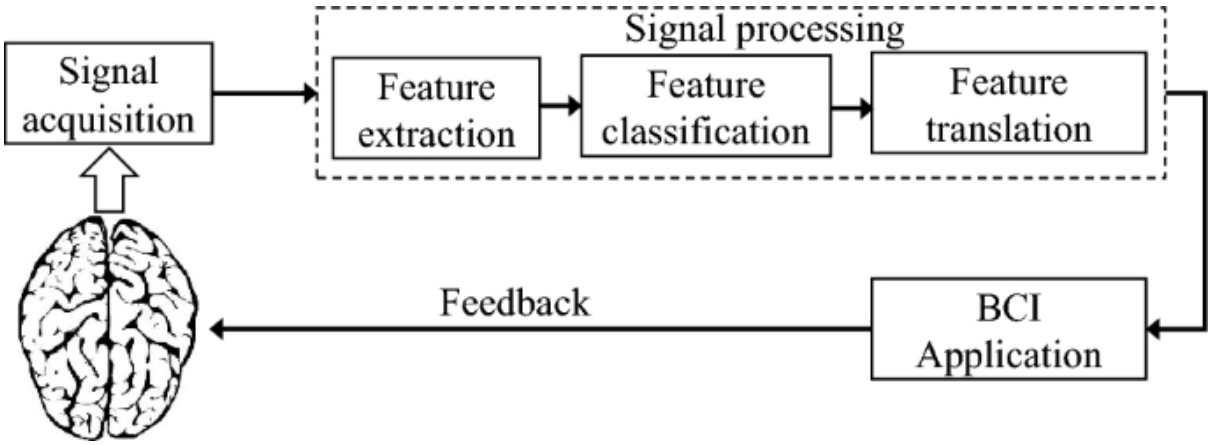
WORKING METHODOLOGY OF BCI

BCIs establish a direct line of communication between the electrical activity of the brain and external gadgets like computers, robotic limbs, electroencephalography equipment, and other brain monitoring tools. For the best impedance and data quality, electrodes are typically placed on the human scalp using conductive electrode gel to collect brain signals non-invasively. Four stages of work take place; Signal acquisition, Signal processing BCI application and then the feedback. The electrical voltages oscillating in the brain which is caused by the biological activities are termed as brain signals. The electrophysical signals represent specific activities of the brain such as movement speech hearing vision etc. In the processing stage the feature is captured, and goes through filtration amplification and digitalization. The signal collected is captured on the basis of time domain and frequency domain and later the artifacts which negatively have an impact also gets removed. The classification performs the work of recognizing patterns and the corresponding features to the same. The output is made in the form of commands to the machine and the external devices connected relatively perform the same. The main feature of these machines is the adaptability. [1]

Every BCI has an algorithm of generating output on an instantaneous note. BCI do not read thoughts directly rather they capture the EEG signal to identify the users emotional state or level of engagement which touches upon the Generative Adversial Network(GAN) found in the BCI machine to convert into the desired output. Its function is to clean out the noisy EEG signals to clean output. The development of P300-based BCIs has made it possible for users to compose music through thought patterns without the need for physical contact by assisting them in choosing notes to create melodies or changing harmonies dynamically based on brain activity.

[1] Baraka Maiseli et al., *Brain–Computer Interface: Trend, Challenges, and Threats*, 10 Brain Informatics 20 (2023).



BASIC PRINCIPLES OF COPYRIGHT LAW

Copyright law as defined protects the literary property of a person. Copyright is the legal framework that controls who can own and use works of literature, music, and art. The basic purpose of copyright is to increase the wealth of culture and information in our society. The materials for giving the authors of a work the sole right to use and commercialise it in this way encourages them. On the other hand, protection lies against any infringement made by other person over their work. In order to obtain copyright, the work shall qualify the following requirements:

- Originality
- Modicum of creativity
- Fixation

Any literary artistic dramatic musical work shall comply with the above requirements to satisfy as a copyright work. On granting copyright, the owner gets to own the work and no other person shall use it without proper permission or on consideration. In relevance to the topic Locke's Labour theory, Hagel's personal theory and Kant's communication theory all protect humans mental personality labour etc and not the machine's autonomus process.

This is addressed in another major principle known as Joint authorship. In the Indian context this doctrine is recognized under Section2(z) of the Copyright Law 1957 where Joint Authorship is defined means a work produced by the collaboration of two or more authors in which the contribution of one author is not distinct from the contribution of the other author or

authors. However there certain Jurisdictions which still do not recognize this concept. The vacuum in the Indian Jurisprudence is it does not analyse technically the different contribution of the users. Drawing the line to the contribution of each author does not have strait jacket formula nor any tests or precedents.

Brain-computer interface (BCI) technology challenges established copyright norms because the resulting works emerge from a complex blend of human brain activity and machine processing. In the UK, the Copyright, Designs and Patents Act 1988 (CDPA) provides for authorship of computer-generated works under Section 9(3), attributing ownership to the individual who arranged the work's creation. Although this provision applies to AI and computer-produced content, its specific application to BCIs remains largely theoretical, with no direct judicial rulings to date.[2] UK case law on joint authorship, such as the decision in *Kogan v. Marin*, highlights factors like mutual intent and inseparable contributions, yet these have not yet been tested in the context of BCI-generated works. In the United States, copyright law mandates human creative input as pivotal, with scholarly opinion favoring a threshold of human involvement—such as editorial control—to claim copyright in works partly derived from BCI outputs. Despite this consensus, US courts have yet to address BCI-specific authorship claims.[3] This legal uncertainty illustrates the pressing need for judicial and legislative efforts to clarify ownership rights in the evolving realm of neurotechnology-generated creations. Until then, copyright claims related to BCIs are assessed primarily through existing computer-generated and joint authorship frameworks, which may insufficiently account for the intricate collaboration between human intent and machine autonomy inherent in these technologies.

In short, The US advocates for legislative clarity, the UK relies on arranger authorship, and India provides for joint ownership, each with limitations for BCI complexity.

THEORATICAL AND LEGAL FRAMEWORKS FOR BCI GENERATED WORKS

Brain-computer interfaces (BCIs) represent a revolutionary merging of human cognitive processes with advanced technological systems, enabling the direct translation of neural activity into digital commands and creative outputs. This profound innovation challenges the

[2] Jonathan Baker, "The Advent of Effortless Expression: An Examination of the Copyrightability of BCI-Encoded Brain Signals," *Minnesota Law Review*, 2020.
[3] Favio Ramirez Caminatti, "Copyrighting Brain Computer Interface: Where Neuroengineering Meets Intellectual Property Law," *Cybaris* Vol. 14, Issue 1, 2023.

core foundations of traditional intellectual property law, particularly copyright law, which fundamentally presumes human authorship and creativity as prerequisites for legal protection. BCIs blur these lines by generating works that arise from the interplay of involuntary neural signals and algorithmic interpretation, raising fundamental questions about authorship, originality, fixation, and ownership.

At the theoretical level, copyright law has long relied upon the concept that protectable works are the product of human intellect manifested through voluntary expression. BCIs disrupt this anthropocentric paradigm by capturing and fixing thoughts directly, bypassing traditional motor or expressive faculties such as speech or handwriting. Consequently, the classical dichotomy between idea and expression becomes muddled since BCIs function as intermediaries translating neural ideas into expressions without human muscular effort. This challenges the applicability of standard doctrines such as the "idea-expression dichotomy," which protects only fixed expressions but not abstract ideas.

Further complicating matters are the legal doctrines of originality and human creativity which require a minimal level of cognitive effort or judgment, often referred to as the "modicum of creativity" or "sweat of the brow." BCIs raise profound doctrinal tension by automating this creative effort, often generating outputs with limited or diffused human intervention. Whether spontaneous neural activity, various signals, or algorithmically filtered content meet these originality criteria is unsettled. This leads to calls for reconsideration or expansion of these doctrines to accommodate hybrid human-machine co-creations.

Legally, jurisdictions have struggled to keep pace with these technological advancements. The United Kingdom's Copyright, Designs, and Patents Act 1988 addresses computer-generated works in Section 9(3), attributing authorship to the individual who prepared the arrangements necessary for the creation of a work when no human author can be identified. While this provision has been applied to AI-generated works, its extension to BCIs remains speculative and untested, particularly given the inseparable contributions from a human brain and technology. Additionally, UK courts have developed principles of joint authorship, as seen in cases like *Kogan v. Marin*, emphasizing the necessity of inseparable contributions and common intention—which might provide a conceptual framework for handling BCI output collaboratively generated by humans and machines.

In contrast, United States copyright law maintains a firm stance on meaningful human authorship, with courts and scholars emphasizing the requirement for significant human creative input. A notable academic perspective argues for an "effort requirement," whereby BCI-generated content qualifies for protection only when the human author edits or curates the raw neural data to remove spontaneous and non-original elements, thereby ensuring the work aligns with the traditional utilitarian goals of copyright law. As of now, no U.S. case law explicitly addresses BCI authorship, but existing doctrines suggest that purely autonomous outputs would struggle to achieve copyright protection absent human involvement.

India's copyright framework offers another dimension, recognizing joint authorship where multiple creators contribute inseparable parts to a work. This model potentially suits the BCI context, where the human user's neural creativity and the BCI developer's technological facilitation coalesce. Nonetheless, Indian law currently lacks precise guidelines to resolve conflicts or ownership disputes arising from such novel collaborations. This gap calls for doctrinal evolution to clarify legal thresholds concerning originality, fixation, and contributory authorship in the neurotechnology arena.

All jurisdictions face critical challenges in addressing legal protection for BCI-generated works, including:

- Authorship Attribution: The hybrid nature of BCIs obscures who qualifies as the author—the human whose brain activity initiates the output, the developer who programs the filtering algorithms, or both jointly.

- Originality and Fixation: Determining whether neural data, once digitized, meets the fixity and originality standards necessary for copyright protection under traditionally human-centric tests.

- Mental Privacy and Data Protection: Safeguarding the privacy and consent of users whose brain data are collected, processed, and potentially commercialized, intersecting copyright with emerging neuro-rights and data protection regimes.

- Enforcement and Liability: Clarifying responsibilities when BCI-generated content infringes existing rights or violates ethical norms, including accountability for potentially harmful outputs.

Legal scholars and policymakers increasingly advocate for interdisciplinary collaboration among neuroscientists, legal theorists, and technologists to develop tailored legal frameworks for BCI intellectual property. Such frameworks might blend traditional human-centric principles with technocentric rights recognizing machine-mediated creativity without undermining human dignity and authorship.

Proposed models include hybrid co-ownership schemes capturing both neural creativity and technical mediation, frameworks emphasizing the "effort requirement" threshold, and legislative adaptations explicitly addressing BCI outputs as a new category of copyrighted works. Additionally, ethical and privacy frameworks are imperative to balance innovation with protection of individual cognitive liberty and mental privacy rights.[4]

In conclusion, BCIs demand a nuanced revaluation and likely reform of existing copyright laws to ensure that legal protection is both applied fairly and supports ongoing technological creativity. The complexity of neurotechnology challenges foundational intellectual property doctrines, signalling the need for innovative jurisprudence, policy solutions, and international harmonization. Absent such evolution, courts and legislators will continue grappling with ambiguous or inadequate doctrines ill-suited to this fast-developing frontier of human-machine collaboration

STAKEHOLDER CONTRIBUTION: USER DEVELOPER AND THE ALGORITHM CREATOR

The ownership and authorship of creative works generated through brain-computer interfaces (BCIs) depend profoundly on the distinct—and often overlapping—roles played by three core stakeholders: the user (the individual whose brain activity initiates the creative input), the developer (those who design and create the BCI hardware and software system), and the algorithm creator (experts crafting the neural decoding and AI algorithms that translate brain signals into usable outputs). Understanding the contributions of each stakeholder is vital for devising equitable, transparent frameworks for intellectual property (IP) rights in this rapidly evolving field.

[4] Ramirez Caminatti, Favio, "Copyrighting Brain Computer Interface: Where Neuroengineering Meets Intellectual Property Law," *Cybaris*, Vol. 14, Issue 1, 2023.

The Role of the User: Original Intent and Mental Creativity

At the heart of any BCI-generated work is the neural activity of the user. This user is an individual whose unique cognitive patterns, intentions, and creativity are fundamental origins of the output. Unlike traditional interfaces, where a person manually crafts or controls expression, the BCI user's brain signals are decoded by machines to produce content, such as digital art, music, or symbolic communications. The user provides the "original intent" through mental creativity, encompassing thoughts, emotions, and decisions that influence the form and substance of the work.

While the user's contribution may vary in directness, ranging from deliberate thought to subconscious patterns, the legal system's conception of authorship traditionally hinges on voluntary, conscious creativity. This raises complex questions for BCI contexts: To what extent must a user intentionally shape neural signals for legal recognition? Can involuntary neural output be protected? Many stakeholders argue that creativity manifested through cognitive processes, regardless of conventional physical expression, deserves protection, reflecting evolving views on cognition and creativity.[5]

This can be illustrated where in a scenario where a composer uses a BCI device to mentally compose a new musical piece by imagining melodies. The BCI software translates these patterns into musical notation. While the user does not physically write the score, this intentional mental activity is the creative source and should confer authorship rights.

The Role of the Developer: Hardware and Software Design

BCI developers design the critical infrastructure enabling neural data acquisition, signal amplification, noise reduction, and user-machine communication. This includes electrodes, sensors, signal processors, and interface software that convert raw neural signals into interpretable data. Their expertise shapes how accurately the device captures brain activity and the versatility with which it translates cognitive neuroscience into practical, usable outputs.

From a legal perspective, developers contribute substantial "arrangement" input, crafting the system's architecture that makes creative expression via the BCI possible. They invest capital,

[5] A Greenberg, "Patent Landscape of Brain-Machine Interface Technology," *Nature Bioengineering Community*, 2024.

time, and innovation in transforming neuroscientific insights into functional devices. Moreover, developers typically own patents and copyrights related to hardware designs, firmware, and interface software vital to BCI operation.[6]

For example a tech company engineers the BCI headset with advanced dry electrodes, reducing user discomfort while enhancing signal fidelity. This hardware innovation is essential for capturing the quality of brain signals that enable creative output, hence the company holds significant intellectual property rights over these technological contributions.

The Role of the Algorithm Creator: Neural Decoding and Artificial Creativity

Specialized algorithm creators develop the computational techniques that decode complex brain signals and translate them into meaningful content through machine learning and AI. These algorithms filter noise, identify patterns associated with user intent, and generate outputs—whether text, images, or commands—that BCI users ultimately control mentally but cannot physically articulate.

The algorithm creator's role is uniquely creative and technical. Their innovation lies in designing systems capable of interpreting neural data with fidelity and generating novel output autonomously or semi-autonomously. Legal questions arise about whether AI components or algorithm-generated outputs themselves warrant protection and how these rights intersect with those of the user and developer.

In case of an AI startup develops a neural decoding algorithm enabling BCI users to control a robotic arm intuitively. The algorithm learns from user feedback, enhancing accuracy and adapting to individual brain signal variations. Both the AI model and its ongoing learning processes embody algorithmic creativity underpinning the BCI work's production.

Interactions Among Stakeholders: Collaborative Authorship Dynamics

BCI-generated creative works typically emerge from a confluence of these stakeholder contributions rather than isolated inputs. The user's mental creativity, enabled by developer-designed hardware, is interpreted and expressed through algorithmic decoding. This intertwined collaboration demands ownership models recognizing joint authorship or co-

[6] Dr. Anil S. M. & Dr. N. Vani Shree, "Navigating Intellectual Property in Brain-Computer Interfacing Technology Systems

ownership, balancing rights, responsibilities, and benefits accrued from the shared creative process.

COMPARITIVE JURISDICTIONAL ANALYSIS OF BCI -GENERATED WORKS IN COPYRIGHT LAW

The rapid evolution of brain-computer interface (BCI) technology demands a thorough examination of how different legal systems address intellectual property (IP) rights associated with works generated through such hybrid human-machine collaboration. This section comparatively analyzes the approaches of the United Kingdom (UK), United States (US), and India, while also considering international treaty frameworks like the Berne Convention and TRIPS Agreement, to elucidate how distinctive legal doctrines influence ownership outcomes for BCI-generated works.

The UK copyright regime, governed primarily by the Copyright, Designs and Patents Act 1988 (CDPA), uniquely addresses computer-generated works under Section 9(3). This provision recognizes that some works may not have a traditional human author but are nonetheless eligible for copyright protection. It defines a "computer-generated work" as one generated by a computer where there is no human author, attributing authorship by legal fiction to the individual who made the “arrangements necessary for the creation of the work.” This allows for protection of certain AI-assisted or autonomous computer creations when human authorship is absent or unclear.

The law maintains the traditional requirement that works must meet an originality threshold characterized by the exercise of skill, judgment, and effort. Thus, the UK courts have historically relied on human creativity as a determinative factor. However, the application of these principles to BCIs remains uncertain. High-profile case law like *Nova Productions Ltd v Mazooma Games Ltd* suggests human authorship is pivotal, although Section 9(3) provides a statutory exception to this rule, applicable where computer generation supersedes direct human creation. Recent developments reflect a growing debate in the UK over whether Section 9(3) adequately addresses modern AI and BCI technologies. The UK government, through consultations and reports by the Intellectual Property Office, has considered removing or modifying the provision if it impedes innovation or causes ambiguity. This underscores a tension between incentivizing technological innovation and preserving the human-centric tradition of copyright.

Furthermore, UK copyright law has provisions for joint authorship, requiring the contributions to be inseparable and created in collaboration, which could serve as a model for attributing shared ownership between the human BCI user and the developers or algorithm creators. Due to the novelty of BCIs, judicial decisions are sparse, and much depends on statutory interpretation and potential future legislative reform.

US copyright law offers a contrasting, more traditionally anthropocentric framework. The statute does not currently recognize non-human authorship. The Copyright Act of 1976 protects "original works of authorship" fixed in a tangible medium, and courts have long emphasized the "idea-expression dichotomy," protecting the expression of ideas but not the ideas themselves. Importantly for BCIs, US courts require a "human author" for copyright protection. The absence of meaningful human creative input in the generation process generally precludes copyright eligibility.

The US Copyright Office's recent policy reports reaffirm that only works with significant human involvement receive copyright. They distinguish between AI-assisted works—where AI operates under human direction—and fully AI-generated works, which are not eligible for copyright. For BCI-generated outputs, the practical interpretation is that mental creativity by the user, if sufficiently purposeful and consciously directed, may meet the authorship standard. However, if the BCI acts as a fully autonomous creator, copyright protection is unlikely.

The US legal system also wrestles with issues of fixation—whether neural data can be fixed in a tangible medium. Courts may require the user to have control or intervention over the fixation process. Additionally, the distributed nature of contributions, involving hardware manufacturers, software developers, and AI algorithm creators, complicate ownership rights. Unlike the UK, US law lacks statutory provisions comparable to Section 9(3), relying heavily on judicial precedents and administrative guidance.

Indian copyright law, rooted in the Copyright Act of 1957, follows a human-centric model but recognizes joint authorship where inseparable contributions to a work arise from collaboration. While there are currently no judgments specifically addressing BCIs, provisions relating to joint works may offer a flexible framework for BCI-generated content given its hybrid nature.

India's approach hinges on interpreting the requirements of originality and fixation, emphasizing human creativity and skill. However, the technological complexities of BCIs

challenge this paradigm, highlighting the need for doctrinal and legislative development. The Indian government and academic scholars have increasingly engaged in discussions around neurotechnology, mental privacy, and the IP ramifications of emerging tech, hinting at future reforms.

Further, India is a member of important international IP treaties such as the Berne Convention, which mandates minimum standards of protection without specifying automation aspects, and TRIPS, which harmonizes rules but stops short of AI-specific guidance. India's compliance with these treaties shapes its international obligations, yet leaves room for domestic innovation.

The Berne Convention for the Protection of Literary and Artistic Works (1886) enshrines foundational copyright principles including the rights of authors, protection of original works, and moral rights. While it does not explicitly address AI or BCIs, its emphasis on human authorship has historically informed member states' laws.

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), administered by the World Trade Organization, sets baseline standards for copyright protection globally but also lacks explicit AI or BCI references. However, both treaties influence national laws by shaping concepts of authorship and originality.

More recently, model laws and recommendations by organizations such as WIPO have begun addressing AI and emerging technologies, advocating for careful legal adaptation to balance innovation incentives with the preservation of intellectual property's core human-centered principles.[7]

Influence of Different Approaches on Ownership Outcomes

These differing national approaches result in varied ownership outcomes for BCI-generated works. The UK's statutory fiction in Section 9(3) allows ownership to be attributed potentially to the BCI developer or system arranger, even absent direct human authorship, facilitating commercial exploitation but raising concerns about diluting human creativity incentives.

Conversely, the US's stringent human authorship requirement may limit protection of AI-assisted or BCI-generated content absent demonstrable human creative input, potentially

[7] Mohan, Shravya. "Brain-Computer Interfaces and The Ownership of Thoughts." *Nayalegal*, 2024.

stifling developers' incentives and complicating ownership claims in complex collaborations.

India's joint authorship doctrine offers a promising route for recognizing multiple contributors, reflecting the collaborative reality of BCI works, but lacks explicit statutory guidance and case law, leading to legal uncertainty.[8]

Internationally, the absence of direct treaty provisions on BCI and AI-generated outputs requires countries to craft laws independently, leading to potential fragmentation and difficulties in cross-border enforcement. Harmonization efforts continue, yet legal uncertainty prevails.

STRATERGY TO RESOLVE THE LEGAL IMBALANCE

A comprehensive strategy for assigning ownership of brain-computer interface (BCI) generated works must carefully navigate the technical, legal, and ethical complexities inherent to human-machine collaboration.

Recognizing the hybrid nature of authorship, ownership should reflect both the individual whose neural activity contributes creative input—the "neural author"—and the developers responsible for hardware, software design, data processing, and output generation. Establishing a joint or co-ownership framework grounded in joint authorship principles ensures that both human users and BCI developers hold undivided rights, with explicitly defined responsibilities for licensing, royalties, moral rights, and rights enforcement.

It is crucial to set minimum thresholds for human creative contribution, such as the degree of cognitive intent or purposeful neural activity, and the extent of human editorial control over the final output. Should human input fall below these thresholds, ownership may default to the arrangers or developers.

Contractual agreements at the point of use must clarify ownership allocation, licensing, revenue sharing, and liabilities while ensuring informed consent around data usage and privacy.

Ethical considerations require embedding mental privacy protections and neuro-rights principles that safeguard sensitive neural data and preserve cognitive liberty against

[8] Gordon, E.C. "Ethical considerations for the use of brain–computer interfaces." *Frontiers in Neuroengineering*, 2024.

unauthorized use.

Transparency measures, including technical audit logs distinguishing neural inputs from algorithmic processing, could facilitate resolving ownership disputes fairly. At the legislative level, the strategy advocates for statutory recognition of BCI-specific intellectual property rights or sui generis regimes, alongside international harmonization of laws to address cross-border challenges.

Finally, alternative dispute resolution mechanisms tailored to neurotechnology IP conflicts should be promoted to reduce litigation burdens. Balancing human creativity protection, innovation incentives, and ethical privacy concerns, this cohesive strategy anticipates practical realities in contract negotiations and legal enforcement, offering a robust foundation for equitable ownership of BCI-generated creative works.

CONCLUSION

In conclusion, brain-computer interface (BCI) technology represents a profound advancement that challenges the existing boundaries of law, ethics, and technology. The unique collaboration between human neural activity and machine processing calls for adaptive legal frameworks that recognize hybrid authorship and ensure equitable ownership of BCI-generated works. Globally, jurisdictions exhibit varied approaches, ranging from the UK's statutory fiction for computer-generated works to the US's stringent human authorship requirements and India’s evolving joint authorship doctrines, highlighting the need for harmonization and legislative clarity. Ethical imperatives such as mental privacy, cognitive liberty, and informed consent must underpin regulatory policies to protect users’ dignity and autonomy. Practically, data security, usability, and liability frameworks are essential to secure trust and promote safe innovation. Although direct case law on BCI copyright infringement remains scarce, anticipated disputes motivate proactive development of dispute resolution mechanisms and clear contractual guidelines. Ultimately, the success of BCI legal governance will depend on interdisciplinary collaboration, flexible yet robust policy measures, and continuous judicial engagement to balance innovation incentives with the protection of fundamental human rights in the rapidly evolving neurotechnology landscape. This research underscores the urgency of evolving intellectual property, privacy, and ethical laws to fully address the transformative potential and challenges posed by BCIs.

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