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The Neural Basis of Nonverbal Communication: How the Brain Processes Body Language Cues

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This theoretical and integrative neuroscience review examines the neural mechanisms underlying nonverbal communication, focusing on how the human brain processes body language cues, including posture, gestures, and facial expressions. Drawing from recent advancements in affective neuroscience, social cognition, and neuroimaging research, the article synthesizes findings across multiple disciplines to explain the functional roles of key brain structures, including the amygdala, prefrontal cortex, superior temporal sulcus, and mirror neuron systems, in decoding nonverbal signals. The review highlights how these structures collaborate to interpret social and emotional meaning embedded in nonverbal behavior, with implications for understanding social disorders and improving interpersonal communication. Particular emphasis is placed on studies from the past 10 years to ensure contemporary relevance. This review also addresses theoretical frameworks such as Embodied Simulation Theory to contextualize empirical findings within broader models of brain evolution and communication. By integrating cognitive, affective, and evolutionary perspectives, this paper aims to clarify the neural architecture that supports nonverbal social interaction.

Keywords: body language, mirror neurons, neuroscience, nonverbal communication, social cognition

非言語コミュニケーションの神経基盤：脳はいかに身体言語の信号を処理するか？

神経科学に関する理論的かつ統合的な本稿は、非言語コミュニケーションの基盤となる神経メカニズムについて、ヒトの脳が、姿勢やジェスチャー、表情を含む身体言語の信号をどのように処理するかに焦点を当てて検証する。本研究では、情動神経科学、社会認知、および脳機能画像研究の近年の進展を踏まえ、非言語信号のデコードにおける扁桃体、前頭前皮質、上側頭溝、ミラーニューロンシステムを含む主要な脳構造の機能的役割を説明するため、複数の分野の知識を統合した。本稿は非言語的行動に組み込まれる社会的、情緒的な意味を解釈するために、どのようにそれらの構造が協調しているかを浮き彫りにし、社会障害への理解や対人コミュニケーションの改善に対する示唆を与えるものである。特に現代的な妥当性を担保するために、過去 10 年間の知見に重点を置いた。また、実証的な知見を脳の進化やコミュニケーションに関するより広範なモデルの中に位置づけるために、身体化されたシミュレーション理論などの理論枠組みにも言及した。認知的、情緒的、および進化的観点を統合することで、本稿は非言語的社会相互作用を支える神経構造を明らかにすることを目的とする。

キーワード：身体言語、ミラーニューロン、神経科学、非言語コミュニケーション、社会認知

Bases Neuronales de la Comunicación No Verbal: Cómo el Cerebro Procesa las Señales del Lenguaje Corporal

La presente revisión teórica e integradora en el campo de la neurociencia analiza los mecanismos neuronales subyacentes a la comunicación no verbal, con énfasis en cómo el cerebro humano procesa las señales del lenguaje corporal, incluyendo la postura, los gestos y las expresiones faciales. Basándose en avances recientes en neurociencia afectiva, cognición social y estudios de neuroimagen, el artículo integra hallazgos interdisciplinarios para analizar el papel de estructuras cerebrales clave, como la amígdala, la corteza prefrontal, el surco temporal superior y los sistemas de neuronas espejo, en la decodificación de señales no verbales. En la revisión se destaca la interacción de estas estructuras en la interpretación del significado social y emocional implícito en el comportamiento no verbal, así como sus implicaciones para comprender los trastornos de la cognición social y optimizar la comunicación interpersonal. La revisión se centra estudios de los últimos diez años para asegurar la vigencia de la evidencia. Además, integra marcos teóricos, como la Teoría de la Simulación Corporal, con el propósito de situar los hallazgos empíricos en el contexto de modelos más amplios sobre la evolución cerebral y la comunicación. Mediante la integración de perspectivas cognitivas, afectivas y evolutivas, este trabajo tiene como objetivo clarificar la arquitectura neuronal subyacente a la interacción social no verbal.

Palabras clave: lenguaje corporal, neuronas espejo, neurociencia, comunicación no verbal, cognición social

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Nonverbal communication plays a key role in how people connect with each other. It works along with spoken or written words to show what someone is trying to say, how they feel, and what social message they are sending. Nonverbal communication includes facial expressions, body movements, the way someone stands (posture), how they look at others (gaze), and the space they keep between people (proxemic). These nonverbal cues are processed by the brain through different but connected parts (Schilbach et al., 2013). As people rely more on digital and mediated ways to communicate, it is more important than ever to understand how the brain works during nonverbal interactions. Such knowledge isn't just important for neuroscience, but also for psychology, anthropology, and artificial intelligence (Pavlova, 2017; Wykowska et al., 2014).

To understand how the brain processes nonverbal communication, a broad, interdisciplinary approach is necessary, incorporating cognitive neuroscience, affective science, and neuropsychology. In the past, researchers mainly studied behavior directly, but now they use brain imaging techniques to see which parts of the brain are active when people perceive or create nonverbal signals (Nummenmaa et al., 2014). These tools have helped identify key brain areas like the amygdala, superior temporal sulcus (STS), premotor cortex, and mirror neuron systems (MNS) that help us understand body language (Adolphs, 2010; Lamm et al., 2016).

This article is a theoretical and integrated review in neuroscience, using findings from neuroimaging studies, clinical observations, and theoretical models to explain how the brain processes body language. It is not intended to be an experimental study but rather a way to organize and explain what is already known. This approach also fits with current efforts in the academic world to create more cohesive, synthetic reviews that bring together research from different fields (Frith & Frith, 2023 Keysers et al., 2020).

One of the foundational frameworks informing this review is Embodied Simulation Theory, proposed by Gallese & Sinigaglia (2011), which suggests that individuals understand the actions, intentions, and emotions of others by internally simulating these states using shared neural substrates. These neural areas are activated both when individuals perform an action and when they perceive it performed by others. Basically, we are capable of understanding what others do thanks to our own capability to perform the same action. This theory is particularly relevant to the study of nonverbal communication, as it offers a neurobiological explanation for how observers interpret body language and affective cues through the activation of MNS.

To provide a coherent overview of this broad topic, the review brings together current neuroscientific findings on how the brain processes key forms of nonverbal communication, including facial expressions, gestures, posture, and multimodal social cues. By synthesizing evidence from neuroimaging, lesion studies, and theoretical models, the paper outlines how different neural systems contribute to social perception and bodily meaning. The review also integrates these perspectives to clarify broader implications for understanding social cognition and highlights conceptual gaps and directions that merit further investigation. In the past ten years, several studies have challenged the traditional view that nonverbal decoding is fixed or universally innate, suggesting instead that cultural context and learned interpretation play a substantial role (Barrett, 2017; Crivelli & Fridlund, 2018; Jack et al., 2016). Table 1 summarizes the most important brain systems discussed in this article and their roles in processing nonverbal signals.

Table 1

Key Brain Regions Involved in Nonverbal Communication

Neural System	Main Function	Supporting Studies
Amygdala	Rapid emotional evaluation of facial/body cues	Adolphs (2010); Sato et al. (2020); Šimić et al. (2021)
Superior Temporal Sulcus (STS)	Motion detection; gaze and gesture interpretation	Schilbach et al. (2013); Pavlova (2017)
Mirror Neuron System (MNS)	Action understanding and simulation	Bonini et al. (2022); Rizzolatti & Sinigaglia (2016);
Prefrontal Cortex	Social decision-making and empathy	Frith & Frith (2023); Nummenmaa et al (2014)
Fusiform Face Area (FFA)	Facial recognition and identity encoding	Jack et al. (2016)

Method

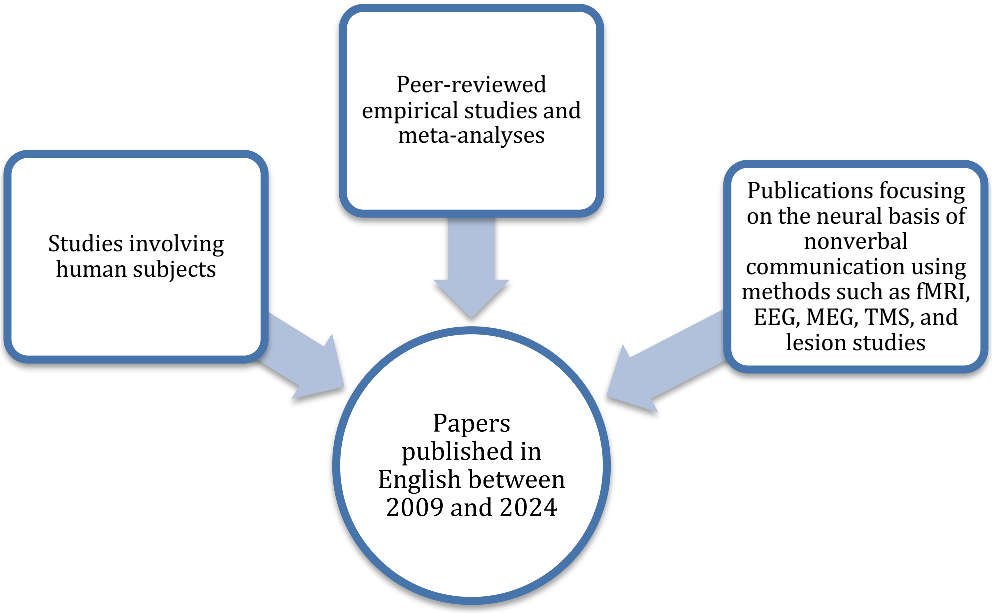
This article adopts a theoretical and integrative neuroscience review approach, synthesizing empirical findings from neuroimaging, lesion studies, and cognitive neuroscience to elucidate the brain mechanisms underlying nonverbal communication. The goal is to build a cohesive framework that bridges various dimensions of nonverbal behavior, including facial expressions, gestures, posture, and gaze, with the neural systems responsible for their perception, interpretation, and social relevance.

Search Strategy and Inclusion Criteria

To ensure a comprehensive and up-to-date analysis, a systematic literature search was conducted across multiple academic databases, including PubMed, Scopus, PsycINFO, and Web of Science, covering publications from 2009 to 2024. Search terms included combinations of keywords such as *nonverbal communication*, *body language*, *facial expressions*, *gesture recognition*, *posture perception*, *mirror neurons*, *amygdala*, *prefrontal cortex*, and *social cognition*. The inclusion criteria for selecting the studies employed for the present review are illustrated in Figure 1.

Figure 1

Inclusion Criteria for Selecting Studies on the Neural Basis of Nonverbal Communication (2009–2024)



The diagram illustrates the criteria used to identify relevant peer-reviewed empirical studies and meta-analyses published in English between 2009 and 2024. Included studies focused on human subjects and employed neuroimaging or neurophysiological methods to investigate nonverbal communication processes.

A total of 1,257 records were initially identified. After screening for relevance and duplicates, 54 articles were selected for final inclusion and thematic analysis.

Data Extraction and Thematic Organization

Relevant studies were grouped based on the type of nonverbal cue investigated and its associated neural substrates. For example:

- Studies on facial expressions were linked to activity in the amygdala, fusiform gyrus, and STS (Ballotta et al., 2023);
- Research on gestures was associated with the MNS, particularly the inferior frontal gyrus (IFG) and inferior parietal lobule (IPL) (Caspers et al., 2010);
- Postural cues and gaze were examined in studies highlighting the roles of the temporoparietal junction (TPJ) and medial prefrontal cortex (mPFC) (Schurz et al., 2021; Van Overwalle & Baetens, 2009).

This thematic structure allowed for a systematic integration of findings across diverse studies, highlighting both convergent and divergent roles of neural systems in interpreting body language.

Analytical Approach

This review adapts a narrative synthesis approach, supported by comparative cross-study analysis to identify trends, gaps, and patterns in the neural decoding of nonverbal cues. Specific attention was paid to:

- Cross-modal integration of visual and motor information;
- Functional specialization vs. distributed processing in social perception;
- Differences in nonverbal processing in clinical populations (e.g., autism spectrum disorder (ASD), schizophrenia).

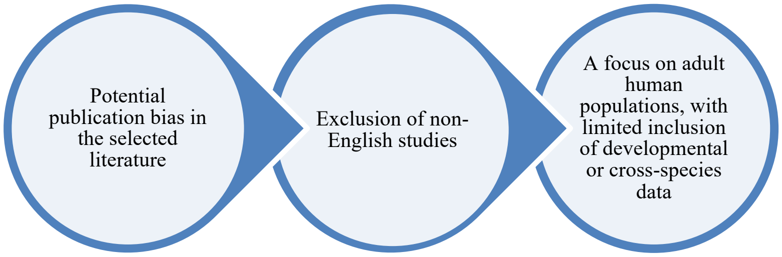
This approach aligns with established standards for theoretical neuroscience reviews (Grant & Booth, 2009; Liberati et al., 2009) and supports the article's contribution as a theoretically driven, integrative model rather than an experimental or meta-analytic study.

Limitations of the Methodology

While comprehensive, this review has certain limitations, summarized in Figure 2.

Figure 2

Methodological Limitations in the Review of Neural Correlates of Nonverbal Communication



The diagram summarizes key limitations identified in the review, including potential publication bias, exclusion of non-English studies, and the predominance of research focused on adult human populations, highlighting the need for broader, more inclusive future investigations.

Future reviews may benefit from meta-analytical techniques or cross-species comparative designs to deepen generalizability and evolutionary interpretations.

Results

This section synthesizes empirical findings from recent neuroimaging, neurophysiological, and lesion studies to reveal how the human brain decodes various categories of nonverbal communication. The evidence is organized into three core domains: (a) facial expressions, (b) gestures and hand movements, and (c) posture and body orientation. Together, these domains illustrate how the brain integrates multiple sensory and cognitive processes to interpret complex social signals that extend beyond spoken language.

Facial Expressions and Emotion Recognition

Facial expressions are among the most immediate and universally understood nonverbal cues. They convey emotion, intent and personality traits, and have evolved as critical tools for survival, enabling rapid interpretation of environmental threats or affiliative signals. Neuroscientific investigations using fMRI and lesion mapping consistently highlight the amygdala's central role in detecting emotionally salient expressions (Šimić et al., 2021), especially fear-related and threat-based expressions (Adolphs, 2017; Jack et al., 2016; Kret et al., 2011).

Several studies demonstrate that the amygdala responds robustly to fearful facial expressions even when participants are unaware of having seen them, such as when images are presented briefly or masked (Mende-Siedlecki et al., 2013). This finding suggests the amygdala's role in unconscious or automatic emotional processing, corroborating the idea of its evolutionary function in early threat detection.

Beyond the amygdala, the STS plays a pivotal role in interpreting dynamic facial movements that signal social intentions, including eyebrow raises, eye gaze shifts, and mouth movements (Sato et al., 2020). These movements often serve as communicative gestures and are not purely emotional but intentional (Pitcher et al., 2019). The STS appears sensitive to changes over time in facial configuration, allowing observers to decode transient social signals such as surprise, attentiveness, or sarcasm.

In parallel, the fusiform face area (FFA), located in the ventral occipitotemporal cortex, is highly specialized for holistic and configural face processing. It is implicated in recognizing facial identity rather than emotion per se (Weiner et al., 2014). Functional connectivity analyses show that these three regions—the amygdala, STS, and FFA—form an integrated face-processing network that enables both rapid emotional recognition and the parsing of social context.

Importantly, lesion studies reinforce these neuroimaging findings. Individuals with bilateral amygdala damage often struggle to recognize fear and anger, while lesions to the STS impair the perception of intentional gaze or facial dynamics, which can be noticed in the case of social anxiety and ASD (Tottenham et al., 2014). The dissociability of these functions across brain regions underscores the complexity and specialization of facial expression decoding mechanisms.

Gestures, Hand Movements, and the Mirror Neuron System

Gestural communication forms an essential complement to spoken language, conveying meaning, emphasis, and intention through visible action. At the neural level, gestures are interpreted through the MNS, a network of brain regions—primarily the IFG and IPL that respond both when performing an action and when observing another person performing the same action (Caspers et al., 2010; Rizzolatti & Sinigaglia, 2016), which is evidence of their role in embodied simulation (Keysers et al., 2020).

This dual activation pattern suggests a simulation mechanism: observers “internally mirror” others' actions to infer their goals and intentions. The MNS facilitates not only literal action understanding but also the inference of unspoken mental states, making it central to social cognition and empathy. Indeed, in addition to the classical mirror system, which is activated both in the performance and in the recognition of an action, there are other mirror areas which are activated both during the experience and the recognition of an emotion. For instance, the insula becomes active both for disgust perceived in first person and for disgust observed in others (Wicker et al., 2003). Analogously, the orbitofrontal cortex activates both for self-experienced regret and for the regret of others (Canessa et al., 2009). Disruption of MNS regions via transcranial magnetic stimulation (TMS) impairs gesture comprehension, providing causal evidence for their role in decoding hand and arm movements (Urgesi, Candidi, & Avenanti, 2014).

Importantly, the MNS does not operate uniformly across all gestures. Emblematic gestures (e.g., peace signs, thumbs up) that carry culturally defined meanings may engage more symbolic processing networks, whereas beat gestures synchronized with speech rely more on rhythmic timing mechanisms. Nonetheless, a meta-analysis by Molenberghs et al. (2012) found that MNS regions were reliably activated across diverse gesture types, confirming the system’s robustness and versatility.

In addition, recent studies indicate that the MNS may be modulated by the observer's expertise, familiarity, or context. For instance, classic ballet dancers or capoeira dancers showed stronger MNS activity when viewing movements from their own dancing style (Calvo-Merino et al., 2005). Analogously, pianists displayed greater activation of the MNS than non-pianists when viewing piano performances (Hou et al., 2017). This contextual sensitivity implies that the brain does not interpret gestures in a vacuum but adapts its simulation mechanisms to social and cultural learning.

Posture, Orientation, and Social Appraisal

Although less conspicuous than facial expressions or gestures, body posture and orientation are powerful indicators of affective state, social status, and interpersonal intent. Observers routinely derive meaning from whether a person is standing tall, slouching, turning away, or facing them directly. The posture conveys conquest, humility, receptiveness, or defensiveness. For instance, individuals taking expansive postures are perceived by the observers as more powerful (Laurin, 2025). Analogously, subjects posing in expansive postures experience a greater feeling of power, as well as an elevation of testosterone levels and a decrease of cortisol levels (Carney et al., 2010). Neuroscientific evidence indicates that interpreting such postural cues involves a different network of brain regions, primarily the precuneus, posterior cingulate cortex (PCC), insula, and parietal cortex (Schilbach et al., 2013).

The precuneus and PCC are implicated in distinguishing self from others, spatial perspective-taking, and mentalizing. These areas become active when individuals interpret the orientation and approachability of another’s posture, such as whether someone is open to interaction or retreating (Schilbach et al., 2013). This neural mechanism supports real-time social appraisal, enabling rapid inferences about dominance, approachability, and threat.

Research has also shown that postures signaling dominance or submission engage distinct neural systems associated with social evaluation and decision making (Metzler et al., 2023). For example, observing dominant body configurations, such as expansive postures with an upright stance, has been found to activate regions like the fusiform gyrus and superior temporal cortex, which are involved in processing socially salient visual cues (Mason et al., 2009)

These neural responses may reflect the brain’s rapid appraisal of hierarchical status through embodied simulation, allowing observers to interpret and assess relative social positioning based on nonverbal displays. The TPJ, which plays a key role in processing both the self and others, is also specifically linked to posture recognition, indicating its strong connection to social cognition (Lamm et al., 2016).

On the other hand, the insula, particularly the anterior insula, is consistently activated in response to observing closed, self-protective postures associated with discomfort or vulnerability. The insula is linked to interoception and emotional resonance, suggesting that viewers may "feel into" the emotional state conveyed by another's posture (Kleckner et al., 2017). This affective simulation supports empathic understanding and the detection of emotional distress.

Overall, these findings demonstrate that postural cues engage a socially tuned brain network that integrates spatial orientation, bodily affect, and social relevance to produce an immediate appraisal of another’s status, emotion, and openness.

Nonverbal Cues Integration into Multi-modal Communication

Human communication involves the integration of multiple nonverbal signals, such as facial expressions, gestures, posture, and prosody, into a unified perceptual experience. This integration is supported by brain regions including the STS, ventromedial prefrontal cortex (vmPFC), and anterior cingulate cortex (ACC), which contribute to the perception and interpretation of socially relevant stimuli (Schirmer & Adolphs, 2017). Neuroimaging and electrophysiological studies demonstrate that this process occurs rapidly and automatically, enabling individuals to extract emotional and intentional cues from complex, dynamic interactions (De Gelder & Poyo Solanas, 2021; Park et al., 2016).

Neural Networks That Underlie Social Cognition

The brain regions involved in higher-order nonverbal interpretation, namely, detecting sarcasm, deception, or empathy, and so on, are the default mode network, the medial prefrontal cortex, and the posterior cingulate cortex (Frith & Frith, 2012). In connection with the described results, the analysis of functional connections indicates that the relationship between the limbic system and the prefrontal cortex is critical for managing affect in social interaction (Pessoa, 2017). Impairments in such systems occur in social cognition disorders, such as schizophrenia and borderline personality disorder (Green et al., 2015).

To consolidate these findings and highlight the distinct yet interconnected neural systems involved in interpreting different categories of nonverbal behavior, the Table 2 aligns each category of nonverbal cues with the neural systems most consistently implicated in their processing and the functions these systems support.

Table 2

Neurofunctional Correlates of Nonverbal Communication

Nonverbal Cue	Key Brain Structures	Core Functionality
Facial Expressions	Amygdala, FFA, STS	Emotion decoding, gaze tracking
Gestures	Premotor Cortex, Inferior Parietal Lobule	Action understanding, motor resonance
Posture	TPJ, PFC, Insula	Self-other differentiation, affective stance
Multimodal Cues	STS, vmPFC, ACC	Integration of audiovisual social signals
Social Inference	mPFC, PCC, Limbic Structures	Empathy, intention attribution, mentalizing

These findings form the basis for the following Discussion section, which interprets the results within the broader context of social neuroscience, considers their implications for communication research, evaluates methodological limitations, and outlines key directions for future research.

Discussion

This review has systematically examined the neural architecture supporting nonverbal communication, particularly the brain's processing of facial expressions, gestures, and postural cues. The findings demonstrate that decoding body language involves a distributed but integrated network, encompassing subcortical regions such as the amygdala and cortical areas including the STS, IFG, and precuneus.

Distributed and Functional Neural Network

Across domains, the evidence supports a multicomponent system rather than a unitary "body language module." Facial expression decoding relies heavily on emotion-processing circuits, particularly the amygdala for threat salience and the fusiform face area (FFA) for identity recognition (Adolphs, 2010; Weiner et al., 2014). Gesture comprehension is rooted in action observation networks, namely the MNS, allowing the observer to simulate the observed motor patterns (Caspers et al., 2010; Rizzolatti & Sinigaglia, 2016). Mirror neuron research has substantially expanded in recent decades, offering insights into social action understanding, affective resonance, and intersubjectivity (Bonini et al., 2022). These neurons, originally identified in premotor cortex of macaques, are now considered foundational for human social cognition. Postural cues engage the social brain, including regions involved in perspective-taking (precuneus), affective empathy (insula), and social salience appraisal (PCC) (Schilbach et al., 2013; Kleckner et al., 2017).

These systems do not operate in isolation. For example, fMRI evidence shows concurrent activation in the amygdala, STS, and IFG when participants are exposed to emotionally expressive gestures, suggesting cross-modal integration (Zaki et al., 2009). This supports models of embodied cognition, wherein action, emotion, and perception are co-represented in an integrative manner. Moreover, resting-state functional connectivity has been shown to predict social behaviors such as trust and reciprocity, further supporting the role of distributed networks in social cognition (Bellucci et al., 2018).

Implications for Social Neuroscience and Communication

The reviewed findings enrich our understanding of how nonverbal cues regulate interpersonal behavior, with direct implications for fields such as affective neuroscience, clinical psychology, and human–computer interaction. For instance, deficits in MNS activity have been associated with social impairments in ASD, reinforcing the clinical value of studying gesture-related brain networks (Hamilton, 2013). Advancements in neuroimaging and immunopsychiatry further suggest promising directions for identifying new biomarkers in mood and affective disorders. Understanding the neural substrates of nonverbal communication may help differentiate between typical and pathological emotion processing patterns. Such biomarkers could enhance early detection and personalized treatment strategies in psychiatric populations (Benedetti & Vai, 2023).

Moreover, recent findings highlight that the processing of dominance cues, particularly those conveyed through posture and facial configuration, engages the parietal and insular cortices, which are critical for the preconscious evaluation of social hierarchy and interpersonal status. Structural differences in these brain regions have been shown to predict individual sensitivity to dominant features, underscoring the neural basis of social appraisal mechanisms (Getov et al., 2015).

These insights may also inform therapeutic strategies for anxiety disorders, as exaggerated neural responses to social threat cues, such as dominant body language, have been linked to treatment outcomes in social anxiety (Burklund et al., 2017). Additionally, clinical research on individuals with unilateral brain damage has shown marked impairments in decoding emotional expressions, underscoring the role of hemispheric specialization in supporting nonverbal social understanding. Such evidence helps illuminate how localized disruptions in neural circuitry can result in broader social cognition deficits (Borod et al., 2010).

Methodological Advances and Limitations

While neuroimaging techniques such as fMRI and MEG have yielded valuable spatial and temporal insights, they still have limitations. Many studies rely on static or decontextualized stimuli, which do not reflect the dynamic nature of real-world social interaction. Recent research has begun to use virtual reality (VR) and naturalistic paradigms, revealing more ecologically valid patterns of brain activity (Tschacher et al., 2014).

In parallel, computer vision and machine learning methods have advanced the field of gesture recognition, enabling automated systems to decode nonverbal signals from skeletal and motion-tracking data (Bencherif et al., 2021). These approaches not only support theoretical models but also open pathways for clinical and assistive technologies, such as sign language recognition and emotion-aware systems.

Further, cross-cultural variability in gesture recognition remains underexplored. Though neural circuits for basic emotion recognition are evolutionarily conserved, culture-specific expressions and postures may engage distinct or modulated neural responses (Jack et al., 2012).

Directions for Future Research

Future investigations should prioritize multimodal approaches combining neuroimaging with physiological and behavioral data to understand how verbal and nonverbal signals are co-processed. In addition, longitudinal studies exploring how nonverbal perception changes across development and aging are critically needed, particularly in light of age-related changes in prefrontal and limbic systems (Cassidy et al., 2021).

A promising avenue lies in applying machine learning to decode brain patterns associated with ambiguous or context-dependent nonverbal cues, advancing brain-computer interface design and emotion-aware technologies (Gratch, 2023). Furthermore, comparative studies in non-human primates could clarify evolutionary continuities in social signal processing (Gruber & Grandjean, 2017).

The neural basis of body language processing is best understood not as a singular mechanism but as an emergent property of coordinated activity across emotion, action, and social cognition networks. Recognizing this interconnectedness not only refines theoretical models in social neuroscience but also has practical implications for clinical diagnostics, technological design, and cross-cultural communication.

Conclusion

This article has examined the neural basis of nonverbal communication through an integrative analysis of the brain systems involved in decoding body language cues such as facial expressions, gestures, and postural signals. The evidence demonstrates that nonverbal communication is not processed by a single brain region but rather emerges from the coordinated activity of several interrelated systems responsible for emotion, motor simulation, perception, and social cognition.

Rather than treating body language as a peripheral or automatic function, this review emphasizes its centrality in social behavior and cognitive-emotional processing. Structures such as the amygdala, STS, IFG, and precuneus collectively contribute to the accurate interpretation of social cues, reinforcing the view that body language decoding is both biologically grounded and context-sensitive.

By synthesizing findings across disciplines, this review contributes to a more comprehensive understanding of how the brain interprets nonverbal signals in real time. These insights have important implications for advancing research in clinical psychology, affective neuroscience, artificial intelligence, and cross-cultural communication.

Future work should continue to explore these neural processes in dynamic and ecologically valid settings, including real-life social interactions and diverse cultural contexts. In doing so, researchers can better capture the complexity and richness of nonverbal communication, paving the way for more inclusive, interdisciplinary, and impactful models of human behavior.

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