Cognitive Boundaries of Metaphorical and Literal Language: Insights from Autism Spectrum Disorder (ASD)

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Abstract

This meta-study explores the boundaries between metaphorical and literal language, with the aim of contributing to a better understanding of what is meant when referring to metaphors. It reviews a key embodied theory that addresses metaphorical processing, enaction theory, and investigates why certain neurodivergent groups, such as individuals with autism spectrum disorder (ASD), are reported to experience difficulties with metaphorical language. The findings suggest that literal and metaphorical language are processed similarly, which might explain why there is still no consensus on what constitutes a metaphor, an ongoing issue in linguistic research. Metaphors may lack enough inherent features to be classified as an objectively distinct cognitive-linguistic category.

Keywords: Metaphors – Embodiment – Enaction – Cognitive Linguistics – Neurodevelopmental Disorders.

Résumé

Cette méta-étude explore les frontières entre le langage métaphorique et le langage littéral, dans le but de contribuer à une meilleure compréhension de ce que l'on entend lorsqu'on parle de métaphores. Elle passe en revue une théorie clé de l'incarnation qui traite du traitement métaphorique, la théorie de l'énaction, et examine pourquoi certains groupes neurodivergents, tels que les personnes atteintes de troubles du spectre autistique (TSA), rencontrent des difficultés avec le langage métaphorique. Les résultats suggèrent que le langage littéral et métaphorique sont traités de manière similaire, ce qui pourrait expliquer l'absence de consensus sur ce qui constitue une métaphore, un problème récurrent dans la recherche linguistique. Les métaphores pourraient ne pas posséder suffisamment de caractéristiques intrinsèques pour être considérées comme une catégorie cognitivo-linguistique objectivement distincte.

Mots-clés : Métaphores – Incarnation – Énaction – Linguistique cognitive – Troubles du développement neurodéveloppementaux.

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1. Introduction

Since Aristotle's Poetics and Rhetoric, what a metaphor is remains an open area of research. Even though some scholars have developed systematised methods to distinguish metaphorical and literal language (Barlow, Kerlin and Pollio 1971; Steen 1999; Steen 2010), a conclusive response has yet to be established. This lack of consensus is driven by the extensive body of literature on metaphor studies, originating from a diverse array of disciplines including neuroscience, literary theory, or linguistics, which encourages multidisciplinary research outcomes (Steen 2023).

This paper aims to identify common elements in the way metaphors are approached in cognitive theories and among autistic individuals, positioning it as a bi-disciplinary meta-study applicable to fields examining metaphorical processing in both neurotypical and neurodivergent populations. Its goal is to provide a clearer understanding of the concept "metaphor" and the cognitive processes involved in its comprehension.

A deeper understanding of metaphorical language carries relevant implications not only for advancing theoretical linguistic theories, but also for applied fields such as psychiatry. Given that the two main institutions responsible for defining mental disorders, the World Health Organisation (WHO) and the American Psychiatric Association (APA), identify the excessive or unusual use of metaphorical speech as symptomatic of certain conditions, clarifying the nature of metaphors could contribute to a more accurate interpretation of these mental disorders and their symptoms. For instance, in Social (Pragmatic) Communication Disorder and Schizotypal Personality Disorder, overly metaphorical speech is a core feature, according to the American Psychiatric Association (2022).

This paper presents a summary of major theories on metaphor studies from a cognitive-linguistic perspective and based on that foundation, it examines research on metaphor comprehension in individuals diagnosed with autism, a group that appears to face particular challenges when interpreting these figurative expressions (see Chahboun et al. 2016; and Lampri et al. 2024 for experimental case studies).

First, the processing of metaphors in communication, particularly when they are effectively understood, is studied through cognitive theories that explore the essential role of the body in the construction of meaning, focusing on enaction theory, which emphasises the real-time, embodied and interactional construction of meaning. Next, this paper questions the infelicity of the communicative act in the phenotypic expression of autism spectrum disorder (ASD) and analyses the underlying reasons for this alleged breakdown in comprehension.

All in all, the analysis calls into question the very nature of metaphorical speech, since the processing of metaphorical language exhibits the same cognitive mechanisms employed in literal language processing. This implies, first, that metaphorical language and literal language essentially belong to the same linguistic dimension, which may explain why clear boundaries in research have been challenging to establish. Secondly, it is observed that metaphorical language is a form of literal language, with major elements (such as ambiguity, familiarity, and context-dependency) altered in a real-time embodied meaning-making processes. And thirdly, it concludes that some autistic individuals do not exhibit issues processing metaphorical language itself, but rather these altered components of literal language.

2. The Dichotomy Between Metaphorical and Literal Language

The dichotomy between metaphorical and literal language stems primarily from two approaches: the literary and the linguistic. In the literary tradition, metaphors have often been perceived as poetic ornaments, separated from everyday language and academic literature, which was considered more suitable for literal discourse. In contrast, the linguistic perspective, particularly the cognitive linguistic perspective, regards metaphors as cognitive tools for comprehending how we perceive our surroundings. In this framework, metaphors are distinguished from literal expressions.

Metaphors are often viewed as linguistic ornaments, with examples predominantly found in poetry (Moser 2000). In this view, metaphors serve as poetic tools used to embellish speech. According to Lakoff (1993), this classical theory rejects the idea that metaphors appear in ordinary, everyday language and instead draws a distinction between poetic and conventional speech. He asserts that, within classical theory, metaphors are defined as novel or poetic linguistic expressions in which words that normally denote a specific concept are used beyond their conventional meaning to express a related one (Lakoff 1993). This definition of metaphor aligns with approaches in literary analysis. Shakespeare's *Sonnets* exemplify this classical understanding of metaphor. For instance, the phrase "Juliet is the sun" functions as a linguistic ornament intended to embellish speech. This same metaphor will later be analysed from a cognitive point of view.

In contrast, cognitive linguists such as Lakoff and Johnson (1980), claim that metaphors are explanatory analogies found in everyday speech that allow us to describe unfamiliar topics using structures from familiar ones. From this perspective, metaphorical language refers to the linguistic process in which the speaker names a physical entity to represent abstract concepts. It allows us to express ideas that can only be conveyed through metaphorical words.

To exemplify this definition, consider any idiomatic sentence such as "a bird in the hand is worth two in the bush". The literal interpretation evokes the image of a bird perched on a hand and two others standing in a bush. The figurative meaning of the phrase represents decision-making, specifically, holding on to a good opportunity that presents itself, rather than risking others that might be better but are not guaranteed. The mechanism used here to make the concept of "making decisions" easily understandable through language is the mental representation of physical reality; metaphors are often used to talk about a conceptual world. Conversely, literal language, as the name itself indicates, literally mirrors the world around the speaker; it reveals through words what is visible to the eye. For example, "the book" is undeniably literal language. "Give them the book" is also a literal sentence. However, "to give support" can be considered a non-literal usage of the language because it may not describe an action enacted in physical reality. The term "to give" is used to refer to another action, "to encourage". This is the cognitivist perspective on approaching the study of figurative language, based on the reasoning of Lakoff and Johnson (1980).

At this point one may come to the conclusion that every abstract word is considered figurative language. Nevertheless, a term is traditionally figurative when used to describe ideas that are difficult to articulate through literal language, therefore metaphors are defined as a "set of correspondences between two conceptual domains" (Lakoff 1993: 203). This definition forms the foundation of contemporary cognitive frameworks such as embodiment. The following section examines this cognitive perspective, exploring the relationship between metaphorical expressions and cognitive processes.

Taken together, metaphors have been understood either as purely ornamental devices that embellish speech or as expressions involving the transference of meaning between two conceptual domains, facilitating our understanding of the world. These represent key approaches to the study of metaphor and, therefore, they introduce a level of complexity that challenges the formulation of what is considered literal and figurative.

3. Metaphor and Cognition

Although no definitive consensus has yet been established on what distinguishes literal and metaphorical language, there is an extensive body of research indicating that scholars are actively investigating the potential distinctions between these two dimensions of language. The very existence of this body of literature constitutes a subject worthy of academic investigation in its own right.

This chapter focuses on embodiment theory as a framework, highlighting enaction as a key theory within it. Readers are encouraged to explore other embodied theories relevant to metaphor processing such as conceptual metaphor theory (Lakoff and Johnson 1980), neural theory of language (Lakoff 2009), embodied simulation hypothesis (Bergen 2012), and deliberate metaphor theory (Steen 2023).

The central principle that embodied theories share can be described in three words: brain, body, and cognition. They emphasise the interconnectedness of neural processes, sensory-motor interactions, and thinking processes within a broader environmental context: "Thought is carried out in the brain by the same neural structures that govern vision, action, and emotion. Language is made meaningful via the sensory-motor and emotional systems, which define goals and imagine, recognize, and carry out actions." (Lakoff 2012: 6)

This theoretical framework suggests that knowledge and understanding is constructed by bodily and sensory experience. Hence, cognitive processes take place within the brain in conjunction with the rest of the body, and the interaction with the world. Embodiment questions "the idea of mind as an emergent and autonomous network." (Varela et al. 1991: 151); it rejects the Cartesian dualism, the mind-body problem. Embodiment suggests that cognition is more than just the product of neural brain processes but is also shaped by the entirety of the body, as it plays a crucial role for performing cognitive processes, including language.

One notable development within this framework is enaction theory, which proposes that our bodies, our language, the world and our social history interact in the way that make cognition possible; the body and the environment mutually construct cognitive processes. According to this theory, word meanings correspond to a system of operations that are activated in a particular context, an enacted context (Cadiot and Tracy 1997). The enacted context may be defined as a real-time, embodied and interactional construction of meaning during communication. That is, the use of words within interaction can generate a meaning extension that diverges from the word's prototypical definition. Consequently, the lexical or prototypical sense of a word may be distant from its high-frequency and contextualised usage.

An example of a word that has evolved from metaphorical to literal use, and whose current meaning often differs from its prototype is the word "head" in French (Cadiot and Tracy 1997). Although the word "head" (tête) is now used in a so-called literal sense, this was not always the case. In the past, the word "head" (testa) referred to a jug or a terracotta

vessel. Its meaning has evolved from being considered metaphorical to literal, which illustrates the fluid nature of metaphorical language.

Nowadays, the term "head" is often used as a synecdoche (a part-for-the-whole relationship) both in metaphorical and literal expressions (Cadiot and Tracy 1997). It can take on different meanings depending on context. In the sentence "they put a hat on their head", "head" refers to the physical part of the body typically covered with hair, excluding other facial or lower head areas. In "they got into the criminal's head", it represents the mind or brain, emphasising a psychological dimension rather than referring to the entire anatomical structure of the head. Meanwhile, in "from head to toe", head functions as a general reference to the upper part of the body, encompassing the entire head without strict concern for where it anatomically begins or ends. The extent to which the so-called literal words truly function as literal invites thoughtful consideration.

These embodied theories suggest that the cognitive processing of metaphors differs from that of literal language, yet there is not enough empirical evidence to affirm that. Although no definitive conclusions have been reached regarding the mechanisms underlying metaphor comprehension, there is substantial evidence indicating that scholars are actively investigating the potential distinctions between metaphorical and literal discourse.

This prompts the question: what factors contribute to the perception of a meaningful distinction between metaphorical and non-metaphorical language processing? If metaphorical and literal language were processed through similar cognitive mechanisms, this would change prevailing theories which often rely on the assumption that metaphors are fundamentally distinct in structure and interpretation from literal language. This point will be developed progressively, with the question being addressed across the following sections and ultimately revisited in the article's discussion.

4. Autism Spectrum Disorder (ASD)

4.1 Definition and symptomatology

Autism Spectrum Disorder (ASD) is a neurological and developmental disorder, which means that some of the symptoms of ASD derive from that innate brain structure and connectivity or can develop during the lifespan as a sequela of other symptoms. Symptoms affect two core domains impacting on functional daily performance (Teufel-Prida and Lopez Prida 2017; Weston 2019; APA 2013).

Deficits in social communication and social interaction may include, first, challenges in social-emotional reciprocity. For example, non-standard back-and-forth conversation, unusual social interactions or reduced sharing of emotions. Secondly, irregularities in nonverbal communicative behaviours used for social interaction. For example, lack of eye contact or atypical understanding and use of gestures. Third, impairments in developing, maintaining, and understanding relationships. For example, difficulty adjusting behaviour to suit various social contexts.

On the other hand, restrictive and repetitive behaviours may present as repetitive speech, motor movements, or use of objects. For example, echolalia refers to the mechanical non-voluntary repetition of words or phrases uttered by another individual, and it is considered a symptom of certain neurological or developmental disorders (APA 2022). They can also involve a marked insistence on sameness and inflexible adherence to routines, often

expressed through ritualised verbal or nonverbal patterns. In addition, some individuals may show highly restricted, fixated interests that are abnormal in intensity and focus, such as strong attachment to unusual objects or perseverative interests. Finally, hyper or hypo-reactivity to sensory input is common, including apparent indifference to pain or temperature, adverse reactions to specific sounds or textures, visual fascination with lights or movement, and behaviours like skin-picking.

Recent results reveal repeated genes and patterns among autistic brains. For instance, the amygdala, the temporoparietal cortex, and the insula seem to work in a similar way in autism (Xu et al. 2018; Weston 2019). However, ASD is a spectrum, which means that no specific characteristic brain structure and connectivity can be attributed to the neurodivergent condition, it varies across individuals.

4.2 Metaphor Comprehension in Autism Spectrum Disorder

Despite the considerable interest in the relationship between autism spectrum disorder (ASD) and metaphorical meaning (see Chahboun et al. 2016; and Lampri et al. 2024 for experimental case studies), there is no concluding evidence to suggest that individuals with ASD face specific difficulties in metaphor processing.

While some studies claim that individuals with this condition exhibit challenges in processing metaphorical expressions, these claims are not universally supported. For instance, two studies conclude that individuals with autism do indeed struggle with metaphorical language processing (Chahboun et al. 2016: 8; Lampri et al. 2024: 2292). These studies suggest that both autistic children and adults might find it difficult to grasp the nuances associated with metaphorical speech, which suggests a tendency for literal or compositional interpretation. Cahbourn et al.'s study (2016) compared the ability to process figurative language in children with high functioning autism and typically developing children. Participants were asked to respond to an audio clip or a figurative phrase by selecting the image that corresponds to its meaning. Each phrase was paired with two images: one representing the literal meaning and one the figurative. The results showed that autistic children were more likely to select the literal images. Lampri et al.'s study (2024) compared the ability of autistic children and typically developing peers to comprehend and produce metaphors. In the first task, participants were asked to select the image that best represents the meaning of a metaphorical expression (similar to the method used in the previous study). In the second task, they had to continue the prompt with the literal equivalent of metaphorical sentences (e.g. "Love is a rainbow. Then, love is…"). The results showed that children with ASD experienced difficulties with both the comprehension and production of metaphors.

However, other research challenges this perspective by stating that metaphorical language comprehension is not a core deficit in individuals with ASD, but rather indicative of broader comprehension challenges. According to these studies, the issues faced by individuals with autism in processing metaphorical language could be attributed to impaired core language skills (Kalandadze et al. 2021; Gernsbacher and Pripas-Kapit 2012). Therefore, the difficulty of interpreting figurative language is not a hallmark feature of ASD but linked to a broader struggle with processing language at the most basic level. Kalandadze et al.'s study (2021) compared the ability to comprehend metaphors in children with ASD and children with typical development. Participants were presented with 24 metaphorical phrases in context and were asked to choose one of the options related to each expression: a correct metaphorical interpretation, a literal

interpretation, or an unrelated interpretation. The results showed that all children understood literal language better than figurative language. However, the ASD group demonstrated greater difficulty with metaphor comprehension. These difficulties were not solely attributable to the diagnosis itself but were linked to core language skills and abstract reasoning. Gernsbacher and Pripas-Kapit (2012) examined previous studies on impaired metaphorical language comprehension in people with ASD. In their analysis, they argue that the claim that autistic individuals experience difficulty with certain types of language lacks sufficient empirical support, except in cases where core language impairments are present. They also highlight that out of the 100-plus articles referenced across the four contributions they reviewed, only two are cited in common, suggesting that none of the contributions capture the full picture. Similarly, the article rejects the idea that autistic people present inherent deficits in empathy or theory of mind.

Furthermore, an alternative interpretation suggests that autistic individuals do not experience substantial difficulties in processing metaphors. Kasirer and Mashal's study (2014) compares the ability to comprehend and generate metaphors in adults with high functioning autism and adults without that diagnosis. In the comprehension task, participants were presented with 20 conventional and novel metaphors and asked to choose among four alternatives: a correct metaphorical interpretation, a literal interpretation, an unrelated interpretation, and an option stating that the expression had no meaning. In the metaphor generation task, participants were asked to reformulate a given concept, encouraging them to write a creative sentence to convey the same idea. The study found that both groups understood metaphors equally well, but the ASD group produced more novel metaphors than the neurotypical adults, contrary to earlier studies on ASD and creativity skills. This may be explained by the neurodivergent nature of autism, as individuals with ASD often develop alternative neural pathways from childhood to compensate for differences in neural development compared to their neurotypical peers. As a result, they may exhibit non-traditional patterns of thinking and behaviour (Livingston and Happé 2017). Overall, this study concludes that autistic individuals do not exhibit significant differences in metaphor comprehension and production compared with their neurotypical individuals. According to the findings, adults with ASD demonstrate intact abilities in both comprehension and generation of conventional and novel metaphors.

If such divergent outcomes are observed, why are individuals with autism often considered to have difficulties with metaphorical comprehension, even when conclusive evidence remains limited? To answer this question, three main points are explored. First, the autistic traits that could suggest challenges in processing metaphorical language are examined. Next, how these characteristics might influence the mechanisms underlying metaphor comprehension are analysed. Finally, a reflection on what such observations may imply for the cognitive boundaries of metaphorical processing is discussed.

4.3 Autism Spectrum Disorder Related Traits and Their Role in Metaphorical Processing Impairments

Although some studies exhibit that individuals with autism spectrum disorder (ASD) face significant challenges in mastering metaphorical skills, other evidence suggests that their capabilities are frequently misinterpreted. The following points explore possible underlying reasons behind this outcome mismatch.

4.3.1 The Role of the Nervous System in the Construction of Metaphorical Meaning

Neurodevelopmental disorders such as autism spectrum disorder (ASD) imply a pathophysiology of the nervous system (Filipe et al. 2023) and this system is where the relation between autism and metaphorical language resides. As the primary system facilitating language, the nervous system serves as both the initiation and culmination of the communicative process and is divided into peripheral and central.

The peripheral nervous system connects the central nervous system with the peripheral parts of the body, serving as a link between the body and the external world; it sends signals from the body to the brain and commands from the brain to the body. On the other hand, the central nervous system is made up of the spinal cord, and the brain and its regions: brainstem, cerebrum, cerebellum, and diencephalon. Their role is to control thought, memory, emotion, touch, motor skills, vision, breathing, hunger, temperature, and all other processes that occur within the body (Thau, Reddy and Singh 2022).

When it comes to the relation between the nervous system and language (Fujii et al. 2016): The classical model of neural basis of language consists of the Broca's area (the motor speech centre), the Wernicke's area (the sensory speech centre), and the arcuate fasciculus (AF) connecting the above two cortical areas. In addition to this, advancements in neuroscience exhibit a larger model comprising the frontal, temporal, and parietal language areas.

However, new findings suggest that ASD may not have resulted solely due to a neurodevelopmental problem in the brain, but to an interplay between altered input from the periphery and disrupted brain development, which makes the explanation more complex than the conventional brain-centric view of neurodevelopmental conditions (Deweerdt 2023).

In this meta-analysis, the possible correlation between the skin and meaning has been identified and linked to embodied theories of metaphor. As in embodiment theories, current research on autism discards the mind-body division in favour of the role of the peripheral nervous system; in this view, the skin as a sensory organ is key for social development and communication. According to enactive theories, the role of body in the space is crucial for learning (Varela, Thompson and Rosch 1991).

The correlation is consistent with what Grady labelled "primary metaphors". For example, the conceptual metaphor AFFECTION IS WARMTH demonstrates a neural path linking affection and warmth during our first experiences in the world. When a human being holds a baby, the baby feels warmth (Lakoff 2009). According to Lakoff, humans understand warmth linked to affection and exhibit it through metaphorical speech: "they gave them a warm welcome", "he is a warm person", or "Juliet is the sun".

Theories like conceptual metaphor theory (CMT) affirm that there is a correlation between a linguistic domain and a conceptual one, where the conceptual one is formed by two concepts: one is reflected through linguistic symbols, and the other concept often represents a universal shared experience. However, autistic and non-autistic individuals experience stimuli differently since ASD often implies hypersensitivity or hyposensitivity to stimuli. Then, they may not relate to the universal shared experience. In this line, ASD presents hyper or hypo-reactivity to sensory input, which can interfere with the understanding of conceptual metaphors such as AFFECTION IS WARMTH in linguistic metaphors like "Juliet is the sun". Therefore, the meaning of "sun" in "Juliet is the sun" that is active in this context may differ from what a neurotypical individual would expect, based on the way relevance is attributed, according to relevance theory (Carston 2010).

Overall, language comprehension not only occurs in the central nervous system, but the peripheral nervous system also plays a crucial role since all the body is involved in the communicative process. As seen in embodied and enacted theories of language, there is a correlation between the peripheral nervous system and semantics. Hence, the skin also makes meaning construction possible because individual interactions with the surroundings are crucial to learn a language; the peripheral nervous system sends external input to the central nervous system, where the inputs are computed. This interface between dermatology and linguistics needs further exploration.

Therefore, according to relevance theory, in a conversation, neurodivergent individuals prioritise meanings they perceive as most relevant over the intended meaning of the expression and the inherent prototypical meaning of the words that make up the utterance (compositionality). In relevance theory, attention automatically goes to what is most relevant, then the success of communication depends on the audience, in this case the autistic individual, considering the stimuli to be relevant enough to be worthy of attention (Carston 2010).

All things considered, in the case of ASD, the impaired nervous system may affect language and communication. The symptoms of neurodevelopmental disorders such as hyper or hypo-reactivity to sensory input might interfere with the comprehension of metaphorical expressions. This hypothesis aligns with embodied theories since the peripheral nervous system plays a crucial role in understanding meaning. However, the interaction with the external environment and the regulation of internal processes, functions of the peripheral nervous system, are not limited to the processing of metaphorical expressions in language comprehension; it shapes non-metaphorical language equally.

In conclusion, the construction of meaning in autistic individuals can be attributed to processing in a broad sense, rather than being limited to metaphorical expressions alone. In accordance with neural theory of metaphor, humans continually form associations between external stimuli and previous acquired knowledge, and this process is not restricted to metaphorical language alone but applies broadly to language as a whole.

4.3.2 The Role of the Theory of Mind (ToM) in the Construction of Metaphorical Meaning

Autism Spectrum Disorder (ASD) is typically characterised by impaired social communication, with pragmatic deficits commonly attributed to diminished theory of mind (ToM) abilities (Williams, Wharton, & Jagoe 2021). Theory of mind (ToM) is defined as the ability to infer other people's mental states (such as knowledge, intentions and believes), which is deemed crucial for understanding metaphorical expressions (Premack and Woodruff, 1978) and all types of communication.

However, several studies test that claim. According to Kalandadze et al. (2021) potential difficulties in metaphor comprehension in individuals with ASD cannot be explained solely by impairments in ToM. This point aligns with research outcomes that confirm that "existing models provide insufficient explanations of any ToM impairment in autism." (Long, Catmur and Bird 2025: 15). In this line, Williams, Wharton and Jagoe (2021: 1) draw on the concept of relevance theory to challenge the notion of impaired theory of mind and pragmatic skills in autism:

> Given that autistic and non-autistic people may have sometimes markedly different embodied experiences of the world, we argue that what is most salient to each interlocutor may be mismatched. Relevance theory would predict that where this

salient information is not (mutually) recognized or adjusted for, mutual understanding may be more effortful to achieve.

A conclusion that calls into question a recognised premise about autistic people and their ToM skills. In this study, Williams, Wharton and Jagoe have demonstrated the various difficulties that non-autistic people present in understanding autistic people, such as problems in inferring autistic affective and mental states. Their findings support the "double empathy problem" (Williams, Wharton and Jagoe 2021), which argues that intersubjective problems between autistic and non-autistic individuals are rooted not in one individual's deficient cognitive system but in a mutual failure to reach consensus.

Therefore, both autistic and non-autistic individuals can engage more actively in understanding mental states. It is what Williams, Wharton and Jagoe call the "double empathy problem": any perceived difficulties in reading mental states may not be inherent but could instead reflect an opportunity for non-autistic individuals to empathise and consider the perspectives of ASD individuals, particularly in understanding what they deem most relevant, according to relevance theory.

In conclusion, individuals with ASD may possess the same capacity as their neurotypical counterparts to infer mental states, knowledge, and intentions. As evidenced, any difficulty in metaphor comprehension is attributable not to the metaphorical expression per se or autistic's impaired ToM abilities, but to the discrepancy between what neurotypical and neurodivergent individuals consider more relevant. Thus, it can be assumed that the enacted context is where differences in meaning are constructed between autistics and their non-autistic peers. Overall, individuals with ASD are likely to understand metaphorical expressions appropriately or poorly, just like neurotypicals.

4.3.3 The Role of Enaction in the Construction of Metaphorical Meaning

For some neurodivergent individuals (i.e. they present a divergent brain architecture and connectivity) such as those diagnosed with autism spectrum disorder (ASD), the enacted context (the real-time, embodied and interactional construction of meaning during communication), seems to be the greatest challenge in understanding semantically ambiguous expressions. Therefore, the primary concern for those who struggle with ambiguity is not linguistic per se, but rather it lies in the relation between the body and social aspects of language shared by a significant portion of society.

As presented in the second part of this paper, according to enactive theories, meaning and cognitive processes are possible as a result of the world-body-language interrelation, and our social history (Varela, Thompson & Rosch 1991: 149). It is this correlation between the body and shared social knowledge or common sense that makes cognition, and language understanding, possible. The body and the environment mutually construct cognitive processes (Varela, Thompson, & Rosch 1991: 150):

> Cognition cannot be properly understood without common sense, and that common sense is none other than our bodily and social history, then the inevitable conclusion is that knower and known, mind and world, stand in relation to each other through mutual specification or dependent co-origination.

Since communication processes are not possible without a shared social knowledge or common sense, enaction questions the existence of a "pregiven world that exists "out there"" (Varela, Thompson, & Rosch 1991: 150). In other words, in enaction the world is not independent of the knower; understanding is only possible because knowledge is constructed collectively, and so is language. However, in the case of neurodevelopmental

disorders symptoms may entail difficulties in the shared aspects of communicative processes such as metaphor understanding.

Considering individuals with ASD often develop alternative neural pathways from childhood to compensate for differences in neural development compared to their non-autistic peers, they may exhibit divergent thinking and behaviour (Livingston and Happé 2017). Since effective communication relies on shared, socially and historically constructed knowledge (both at the collective and individual levels), the divergent cognitive nature of the autistic condition may result in unconventional constructions of meaning. Consequently, accurately interpreting the speaker's intended meaning in real-time situations may be a daunting task and communication can, therefore, become more demanding.

5. Discussion: Implications for Metaphor Theory

Given that no conclusive studies demonstrate that metaphorical sentences are processed differently from literal sentences and considering that autistic individuals (often identified as a neurodivergent collective facing challenges with metaphorical expressions) do not show specific difficulties in understanding metaphorical sentences either, but rather in other areas such as the enacted context or core language skills, this suggests that metaphorical and literal sentences may be processed similarly. Thus, what leads researchers to assume they differ? Let us explore the elements that define metaphorical expressions and differentiate them from literal ones.

Evidence exhibits that some ASD individuals may experience general difficulties with language and, more specifically, with unfamiliar language and semantic ambiguity because of inherently biological factors such as the divergent nervous system, and behavioural phenotypes influencing decoding pragmatic cues, working memory, prioritising skills, sustained attention abilities and processing speed (to accurately extract meaning in spontaneous speech).

However, one should consider that semantic ambiguity is equally present in non-metaphorical language that permits multiple syntactic interpretations (e.g. "he saw the man with the telescope") which once again suggests that cognitive processes underlying metaphorical and literal language may not be substantially different.

All in all, the assumption that individuals diagnosed with ASD are unable to comprehend or utilise metaphorical speech is likely misleading, consistent with the findings of studies by Kalandadze et al. (2021), Gernsbacher and Pripas-Kapit (2012) and Kasirer and Mashal (2014). Just as neurotypicals exhibit significant individual differences, neurodivergent brains also vary widely. What they share are specific cognitive characteristics whose visible symptoms present additional challenges in their daily lives, and limited metaphor understanding is not inherently one of them.

Moreover, given that metaphor understanding does not require special effort for these neurodivergent populations, metaphors are questioned to be cognitively dissimilar to literal language. The evidence suggests that metaphors are processed in a manner akin to literal language, with distinctive linguistic and pragmatic features influencing their interpretation such as ambiguity, creativity, familiarity with the expression and the dependence on the context. However, these features are not as deviant from literal language as to affirm that they constitute a systematised separate category in language understanding.

These results are also supported by a meta-analysis conducted by Fedorenko, Hauptman, and Blank (2023) on non-literal language comprehension, which analysed 74 fMRI studies involving 1430 participants between 2001 to 2021. They affirm that, while the neurocognitive mechanisms underlying lexical access and syntactic structuring are well established, the processes responsible for comprehending language beyond core operations (such as figurative and pragmatic meanings) remain unknown. They define this broader domain as "non-literal language comprehension" to refer to the gamut of cognitive processes related to language comprehension that go beyond lexical access and phrase-structure building. It encompasses classic non-literal phenomena like metaphors; discourse level comprehension; pragmatic phenomena like irony; and prosody. To investigate the neural basis of these phenomena, the study evaluated three networks: the language selective network (for literal meaning), the theory of mind network (for social inference) and the multiple demand network (for extra cognitive resources such as working memory, problem solving or abstract reasoning). The results suggest that figurative language primarily engages the first two networks, which implies that it is supported by the same core mechanisms as literal language, rather than requiring additional executive resources.

Taken together, the sheer diversity of theoretical outcomes casts doubts on the existence of metaphorical speech as a separate cognitive process. In addition to this, neurotypical and neurodivergent populations process metaphorical and literal language similarly, since there is no evidence indicating a cognitive profile that exhibits a specific difficulty with metaphor understanding. These conclusions align with the fMRI evidence of 74 different studies on non-literal language processing.

As a final remark, these insights suggest that, to date, there is no specialised cognitive process dedicated exclusively to metaphors since there is no significant distinction between processing metaphorical and literal language. Instead of them being considered as separated categories, both dimensions of language are processed through the same cognitive mechanisms, regardless of being a neurotypical or a neurodivergent individual. The differences arise from small-scale variations in features including ambiguity, creativity, familiarity with the expression and the dependence on the context. This reinforces the conclusion that metaphors operate within the same linguistic framework as non-metaphorical language, indicating that metaphors are not a separate interpretative category but rather an extension of language.

Conclusion

The lack of concluding evidence supporting the notion that metaphorical language is processed though different cognitive mechanisms to literal language in neurotypical and neurodivergent populations suggests that both dimensions of language are processed in a similar way. The differences arise from small-scale variations in features including ambiguity, creativity and familiarity with the expression in an enacted context. However, these distinctions between metaphorical and literal language processing are subtle and appear to stem from social or contextual influences, rather than cognitive ones, which might explain why there is still no consensus on what constitutes a metaphor.

References

AMERICAN PSYCHIATRIC ASSOCIATION. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association Publishing.

AMERICAN PSYCHIATRIC ASSOCIATION. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). American Psychiatric Association Publishing.
BARLOW, John, KERLIN, James, & POLLIO, Howard. (1971). *Training manual for identifying figurative language*.

BERGEN, Benjamin. (2012). *Louder than words: The new science of how the mind makes meaning*. Basic Books.

CADIOT, Pierre, & TRACY, Leland. (1997). On n'a pas tous les jours sa tête sur les épaules. *Sémiotiques*, (13), 105–122.

CARSTON, Robyn. (2010). Lexical pragmatics, ad hoc concepts and metaphor: A Relevance Theory perspective. *Italian Journal of Linguistics*, 22(1), 1–22.

CASELLA, Rosaria, MINIELLO, Annalisa, BUTA, Filippo, YACOUB, Mohamed R., NETTIS, Enzo, PIOGGIA, Giuseppe, & GANGEMI, Salvatore. (2024). Atopic dermatitis and autism spectrum disorders: Common role of environmental and clinical co-factors in the onset and severity of their clinical course. *International Journal of Molecular Sciences*, 25(16), 8936. URL : https://doi.org/10.3390/ijms25168936

CHAHBOUN, Souad, VULCHANOV, Ivan, SALDAÑA, David, ESHUIS, Hans, & VULCHANOVA, Mila. (2016). Can you play with fire and not hurt yourself? A comparative study in figurative language comprehension between individuals with and without autism spectrum disorder. *PLoS ONE*, 11(12), e0168571. URL : https://doi.org/10.1371/journal.pone.0168571
DEWEERDT, Sarah. (2023). On the periphery: Thinking "outside the brain" offers new ideas about autism. *The Transmitter*. https://doi.org/10.53053/ajte9272

FEDORENKO, Evelina, HAUPTMAN, Miriam, & BLANK, Idan. (2023). Non-literal language processing is jointly supported by the language and Theory of Mind networks: Evidence from a novel meta-analytic fMRI approach. *Cortex*, 162, 96–114. URL : https://doi.org/10.1016/j.cortex.2023.01.013
FILIPE, Maria Gabriela, CARVALHAIS, Luis, ABBEDUTO, Leonard, & FROTA, Susana. (2023). Language across neurodevelopmental disorders. *Frontiers in Psychology*, 13, 1121997. URL : https://doi.org/10.3389/fpsyg.2022.1121997

FUJII, Masako, MAESAWA, Shoko, ISHIAI, Shigeyoshi, IWAMI, Koichi, FUTAMURA, Makoto, & SAITO, Kazuya. (2016). Neural basis of language: An overview of an evolving model. *Neurologia Medico-Chirurgica (Tokyo)*, 56(7), 379–386. URL : https://doi.org/10.2176/nmc.ra.2016-0014
GERNSBACHER, Morton Ann, & PRIPAS-KAPIT, Susan Rachel. (2012). Who's missing the point? A commentary on claims that autistic persons have a specific deficit in figurative language comprehension. *Metaphor and Symbol*, 27(1), 93–105. URL : https://doi.org/10.1080/10926488.2012.656255
GIORA, Rachel. (2003). *On our mind: Salience, context, and figurative language*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195136166.001.0001

GRADY, Joseph. (1997). *Foundations of Meaning: Primary Metaphors and Primary Scenes*. PhD Dissertation, University of California, Berkeley.

KALANDADZE, Tamara, BRAEKEN, Jesper, BRYNSKOV, Christoffer, & NÆSS, Knut Bjarte. (2021). Metaphor comprehension in individuals with autism spectrum disorder: Core language skills matter. *Journal of Autism and Developmental Disorders*, 52(1), 316–326. URL : https://doi.org/10.1007/s10803-021-04922-z

KASIRER, Ayala, & MASHAL, Nirit. (2014). Verbal creativity in autism: Comprehension and generation of metaphoric language in high-functioning autism spectrum disorder and typical development. *Frontiers in Human Neuroscience*, 8, Article 615. https://doi.org/10.3389/fnhum.2014.00615

LAKOFF, George & JOHNSON, Mark. (1980). *Metaphors We Live By*. The University of Chicago Press.

LAKOFF, George. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and thought* (2nd ed., 202–251). Cambridge University Press.

LAKOFF, George. (2009). *The neural theory of metaphor*. University of California, Berkeley.

LAKOFF, George. (2012). Foreword. In B. Bergen, *Louder than words: The new science of how the mind makes meaning*. Basic Books.

LAMPRI, Sofia, PERISTERI, Evangelia, MARINIS, Theodoros, & ANDREOU, Maria. (2024). Metaphor comprehension and production in verbally able children with autism spectrum disorder. *Autism Research*, 17(11), 2292–2304. URL : https://doi.org/10.1002/aur.3210

Livingston, Lucy, & Happé, Francesca. (2017). Conceptualising compensation in neurodevelopmental disorders: Reflections from autism spectrum disorder. *Neuroscience & Biobehavioral Reviews*, 80, 729–742. URL : https://doi.org/10.1016/j.neubiorev.2017.06.005

LONG, Elizabeth Leigh, CATMUR, Catherine, & BIRD, Geoffrey. (2025). The theory of mind hypothesis of autism: A critical evaluation of the status quo. *Psychological Review*. Advance online publication. URL : https://doi.org/10.1037/rev0000532

MORSANYI, Kinga, HAMILTON, Jennifer, STAMENKOVIĆ, Dušan, & HOLYOAK, Keith James. (2021). Linking metaphor comprehension with analogical reasoning: Evidence from typical development and autism spectrum disorder. *British Journal of Psychology*, 113(2), 479–495. URL : https://doi.org/10.1111/bjop.12542.

MOSER, Katharina Sabine. (2000). Metaphor analysis in psychology: Method, theory, and fields of application. *Forum: Qualitative Social Research*, 1(2).

PREMACK, David & WOODRUFF, Guy. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 1(4), 515–526.

STEEN, Gerard Jan, DORST, Aletta Geertrui, HERRMANN, J. Berenike, KAAL, Anna Aletta, & PASMA, Tineke. (2010). A method for linguistic metaphor identification: From MIP to MIPVU. Amsterdam : John Benjamins.

STEEN, Gerard Jan. (1999). From linguistic to conceptual metaphor in five steps. In R. W. J. Gibbs & Gerard Jan Steen (Eds.), *Metaphor in cognitive linguistics: Selected papers from the Amsterdam metaphor conference* (57–78). John Benjamins.

Steen, Gerard Jan. (2023). *Slowing metaphor down: Elaborating deliberate metaphor theory*. Amsterdam : John Benjamins Publishing Company.

TEUFEL-PRIDA, LILIANA Alejandra, & LOPEZ Prida, Jorge Alejandro. (2017). Systemic levels in neurodevelopmental disorders. In *DSM-5 and family systems* (1–28). Springer Publishing Company. URL : https://doi.org/10.1891/9780826183996.0001

THAU, Liron, REDDY, Venkatesh, & SINGH, Pradeep. (2022). Anatomy, central nervous system. *StatPearls*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK542179/

Varela, Francisco Javier, Thompson, Evan, & Rosch, Eleanor. (1991). *The embodied mind: Cognitive science and human experience*. MIT Press.

Weston, Christopher Samuel Edwin. (2019). Four social brain regions, their dysfunctions, and sequelae, extensively explain autism spectrum disorder symptomatology. *Brain Sciences*, 9(6), Article 130. https://doi.org/10.3390/brainsci9060130

Williams, George Laird, Wharton, Tony, & Jagoe, Christopher. (2021). Mutual (mis)understanding: Reframing autistic pragmatic "impairments" using relevance theory. *Frontiers in Psychology*, 12, Article 616664. https://doi.org/10.3389/fpsyg.2021.616664

World Health Organization. (2014). *Mental disorders*. Retrieved from http://www.who.int/mediacentre/factsheets/fs396/en

XU, Jian, WANG, Hong, ZHANG, Li, XU, Zhixuan, Li, Tianyi, ZHOU, Zhi, ZHOU, Zhiyong, GAN, Ying, & HU, Qi. (2018). Both hypo-connectivity and hyper-connectivity of the insular subregions associated with severity in children with autism spectrum disorders. *Frontiers in Neuroscience*, 12, 234. URL : https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2018.00234/full