Comprehension and production of emotional words in communication-related disorders: A Narrative Review

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Abstract: Language and emotion processing have typically been studied separately. Nonetheless, the interest on how semantic emotional features affect linguistic processing has increased in recent years. Research has shown that emotion plays a role in all components of language understanding and expression. This is especially important for individuals with communication-related disorders, who often experience difficulties in both language processing and emotional understanding. This review synthesizes what is known about the processing and use of emotional words in individuals with impairments that affect their communication. We focused on Developmental Language Disorder (DLD), Aphasia, and Autism Spectrum Disorder (ASD). This research can be of help to deepen our understanding of emotional language processing in general, as well as the specific challenges faced by these populations. The review underscores the importance of applying this knowledge to improve assessment methods and therapeutic strategies tailored to individuals with communication-related disorders, while also calling for further research to fully understand the complexities involved. Finally, we underscore the need to conduct research on individuals with writing and reading disorders like developmental dyslexia since evidence on the processing of emotional language in these populations is still marginal.
Keywords: Language; Emotion; Developmental Language Disorder; Aphasia; Autistic Spectrum Disorder; Speech therapy

ESP Comprensión y producción de palabras emocionales en trastornos de la comunicación: una revisión narrativa

Resumen: El procesamiento del lenguaje y el de las emociones se han estudiado normalmente por separado. No obstante, en los últimos años ha aumentado el interés por saber cómo afectan los rasgos semánticos emocionales al procesamiento lingüístico. La investigación ha demostrado que la emoción desempeña un papel relevante en todos los componentes de la comprensión y la expresión lingüísticas. Esto es especialmente importante para las personas con trastornos relacionados con el lenguaje y la comunicación, que a menudo experimentan dificultades tanto en el procesamiento del lenguaje como en la comprensión emocional. Esta revisión sintetiza lo que se conoce sobre el procesamiento y el uso de palabras emocionales en personas con dificultades lingüísticas y comunicación. Nos centramos en el Trastorno del Desarrollo del Lenguaje (TDL), la Afasia y el Trastorno del Espectro Autista (TEA). Esta investigación puede ser de ayuda para profundizar en la comprensión del procesamiento del lenguaje emocional en general, así como de los retos específicos a los que se enfrentan estas poblaciones. La revisión subraya la importancia de aplicar estos conocimientos para mejorar los métodos de evaluación y las estrategias terapéuticas adaptadas a las personas con trastornos relacionados con la comunicación, al tiempo que reclama más investigación para comprender plenamente las complejidades implicadas. Por último, subrayamos la necesidad de llevar a cabo investigaciones en personas con trastornos de la escritura y la lectura, como la dislexia evolutiva, ya que la evidencia sobre el procesamiento del lenguaje emocional en estas poblaciones es todavía marginal.
Palabras clave: Afasia; Emoción; Lenguaje; Logopedia; Trastorno del desarrollo del lenguaje; Trastorno del espectro autista.

Summary: Introduction. Emotional word processing in individuals without language impairments. Processing and use of emotional words in Developmental Language Disorder. Processing of emotional words in Aphasia. Processing of emotional words in Autism Spectrum Disorder (ASD). Discussion. References.

Introduction

Emotional experiences permeate all aspects of human daily life. During social interactions, humans rely on different sources of information, like facial expressions or body gestures, to communicate and understand emotions. Language is another powerful tool for expressing, perceiving, and regulating emotions (Hinojosa et al., 2023). However, its role has often been neglected in the field of affective science. Recently, proposals such as appraisal views of emotions (e.g., Moors et al., 2013) have started to grant an explicit role to language in emotional experiences. According to this perspective, emotions arise from an initial appraisal of a situation's relevance to an individual, which triggers action-preparation processes, accompanied by physiological changes appropriate for coping with significant events. Subsequently, these changes are consciously experienced leading to a feeling that can be communicated through verbal vocalizations (Scherer & Moors, 2019). Furthermore, research in language processing has also highlighted the role of emotion in language use. Recent proposals, such as the *Affective Language Comprehension model*, emphasize the need to consider contextual aspects of utterances communicating and eliciting emotions during verbal interactions, as well as the affective features of language users (van Berkum, 2019).

These theoretical advances have allowed studies about the interaction between language and emotion to flourish in recent years. Indeed, current evidence indicates that the emotional features of words modulate a wide range of language processes underlying the comprehension and production of words and sentences, from phonetics to syntax (Foolen, 2012; Majid, 2012; Poch et al., 2023). Researchers are also becoming increasingly interested in the contextual, conversational and pragmatic aspects of emotional language, particularly the influence of social and cultural norms in the communication of emotions and the role of emotions in interpersonal relationships (Hernández-Gutierrez et al., 2023; Hinojosa et al., 2020b; van Berkum, 2020; Vergis, 2023). This includes topics such as the mutually adaptive and intersubjective coordination of interactors' feelings, the relevance of affective content in communicative intentions, or the creation of affective meaning through joint actions between the sender and the receiver (Langlotz & Locher, 2013; Scarantino et al., 2017; Wharton et al., 2021).

Additionally, research has shown that paralinguistic cues, such as prosody (i.e., changes in the pitch, intensity and duration of utterances), are essential for conveying vocal emotion or revealing interpersonal information and attitudes (Pell et al., 2009; Pell & Kotz, 2021; Vergis & Pell, 2020). Of note, this growing understanding of the relationships between language and emotion contrasts with our limited knowledge about emotional language processing in individuals with disorders that can affect their communication. Research within this field has been mostly limited to individuals with Developmental Language Disorder, Aphasia, or Autism Spectrum Disorder.

The main objective of this review is to highlight the need to examine the impact of emotion in word processing, particularly in research and the assessment of individuals with language or communication impairments. To do so, we first provide an overview of how individuals without language impairments represent and processes emotional language. Subsequently, our focus will shift to those studies that have addressed emotional language in people with Developmental Language Disorder, Aphasia, or Autism.

Emotional word processing in individuals without language impairments

Studies on the interplay between language and emotion have been grounded on different theoretical conceptions of emotions. These theories underscore different aspects of emotions like facial and physiological profiles (basic emotion theories, Ekman, 1993), subjective feelings (constructivist theories, Barrett & Lida, 2024), or emotional experiences (dimensional theories, Russell, 2003). However, most theories agree that emotion episodes involve ongoing cognitive processes, physiological states and motor activation (see Reisenzein, 2002, and Scherer, 2022, for further discussion on this topic).

Constructivist approaches to emotions assume that language-derived knowledge is involved in shaping the way that individuals perceive emotions from an early age (Barrett & Lida, 2024; Lindquist, 2013). Along this line, developmental studies suggest that children's conceptual knowledge about emotions expand as they become more skilled with language (Nook et al., 2017). Alternatively, some theories propose a universal taxonomy of emotions. They are associated with a distinct set of neurobiological mechanisms, cognitive appraisals, and action tendencies (Lazarus, 2001). For instance, discrete emotions accounts conceive a limited number of emotions with different adaptive functions that have been selected trough evolution (Ekman, 1993; Izard, 2007). These basic emotions typically include fear, anger, sadness, disgust, surprise and happiness. Accordingly, the conceptual aspects of emotion are organized around these primary emotions (Johnson-Laird & Oatley, 1998), although subsequent classifications have argued for the need of further differentiating between discrete positive emotions such as awe, contentment, pride, relief, amusement (Cowen & Keltner, 2021; Shiota et al., 2017). Research conducted under these assumptions suggest that words words expressing disgust (e.g., *garbage*) are

processed slower than words denoting fear (e.g., *panic*), which are identified slower than anger-related words (e.g., *rage*) (Briesemeister et al., 2011; Ferré et al., 2018; Huete-Pérez et al., 2019; Ponz et al., 2014; Santaniello et al., 2022). With regard to positive discrete emotions, there is correlational evidence suggesting an earlier acquisition of words conveying amusement (e.g., *game*) compared to those expressing other positive emotions like awe (e.g., *authenticity*) (Hinojosa et al., 2024). Nonetheless, as we shall see, most studies on the interplay between language and emotion have relied on the assumptions of dimensional models of emotion (Russell, 2003). From this perspective, the dimensions of valence (i.e., the hedonic tone of a word, from negative or unpleasant, to positive or pleasant) and arousal (i.e., the degree of activation elicited by a word referent, ranging from calming to exciting) organize the representation of the emotional content of words.

Before introducing the results those studies dealing with the processing of emotion words grounded on the dimensional conception of emotions, it is worthy to mention that one important aspect that have guided research on emotional language concerns the representation and organization of words with affective referents in the meant lexicon. A key distinction in emotional vocabulary has been made between emotion-label words (henceforth, EM) and emotion-laden words (henceforth, EL) Whereas the former directly denote emotional experiences or feelings (e.g., *satisfaction*, *sorrow*), the later have acquired emotional connotations but do not express specific emotional states (e.g., *gun*, *money*) (Altarriba & Basnight-Brown, 2012; Pavlenko, 2008; Wu & Zhang, 2020). The structure of the EM lexicon shows a prototypical organization, with some concepts or exemplars being more representative of an emotion than others (Alonso-Arbiol et al., 2006; Fehr & Russell, 1984; Galati et al., 2008). In addition to the affective dimensions of valence and arousal, other factors such as emotional intensity (intense > non-intense), the duration of the emotional experience (brief > long), and interoceptive bodily sensations associated with emotion episodes, also contribute to the representation of the most prototypical emotional concepts (Ferré et al., 2024a; Niedenthal et al., 2004; Pérez-Sánchez et al., 2021; Vigliocco, 2009). Furthermore, recent proposals suggest that people's intentions and resources shaped by context-dependent factors are also actively used in the construction of emotional meaning (Winkielman et al., 2023), which is constrained by cross-linguistic and cultural variation (Jackson et al., 2019; Lindquist et al., 2022). Taken together, these findings align with neurobiological claims that have argued for a distributed conceptual representation of emotion across brain regions dealing with verbal, sensorimotor and bodily information associated with internal and external affective experiences, which include both language-related (e.g., inferior frontal gyrus, anteriomedial temporal lobe) and emotion-related (e.g., orbitofrontal and ventromedial prefrontal cortices, amygdala) brain structures (Hinojosa et al., 2020a; Kissler et al., 2023).

Interestingly, sublexical elements, such as phonemes, also contribute to the conceptual representation of emotion words. For instance, the finding of affective sound symbolism effects (i.e., non-arbitrary mappings between certain phonemes and the emotional meaning of words) suggest that acoustic parameters and phonological properties are used to express emotion (Adelman, 2018; Calvillo-Torres et al., 2024; Conrad et al., 2022; de Zubicaray & Hinojosa, 2024). In particular, certain phonemes like /-i/ tend to be overrepresented in words expressing positive emotions (e.g., *friendly*), possibly because of an overlap in the muscles used to smile and to utter this phoneme (Rummer & Schweppe, 2019). In contrast, negative, high-arousal words tend to include fricative consonants (e.g., the phoneme /s/ in the word *snake*), which mimic hissing sounds by some threatening animals (Schmidtke & Conrad, 2018). Furthermore, the results of typological studies examining the structure of several languages suggest that some morphological markers like the evaluative affixes used to express diminution have a positive connotation (Calvo, 2019; Foolen, 2012; Ponsonnet, 2018). In agreement with these observations, an ameliorative function for diminutive suffixes in attenuating emotion the negative meaning of words has been reported (Hinojosa et al., 2022).

With regard to the processing of emotional language most research has focused on the lexical and semantic aspects involved in word comprehension (see Ferré et al., 2025 for a recent review), whereas few studies have examined emotion's role in word production. Current evidence indicates that emotional content hampers speech planning and articulation processes involved in the utterance of emotion words (Hinojosa et al., 2010), and the generation of negative words (Rohr & Rahman, 2018). Studies on word comprehension have shown that positive words are recognized more quickly in tasks like lexical decision and emotion categorization (Ferré et al., 2024b; Haro et al., 2024; Rodríguez-Ferreiro & Davies, 2019). Evidence with regard to negative words is not conclusive since their identification elicits either delayed (Hatzidaki & Santesteban, 2024) or speeded responses (Vinson et al., 2014). This disparity has been attributed to a modulatory role of arousal. In this sense, the processing advantage is only observed for negative words that also denote activating concepts (Citron et al., 2014). These findings align with the view that human beings are prepared by evolution to form associations between negative stimuli and high arousal that prompt quick responses to cope with threating situations (Gibbons et al., 2023).

Another line of research has examined the effects of different psycholinguistic factors on the processing of the emotional content of words. In this sense, negative orthographic neighbours (i.e., words of the same length sharing all except one letter) speed word processing (Faïta-Aïnseba et al., 2012; Gobin et al., 2012; Gobin & Mathey, 2010). These results suggest that the conceptual features of emotion words are accessed before orthographic processing has been completed, possibly through top-down mechanisms (Yap & Seow, 2014). Also, a consistent interaction between word frequency and valence has been reported. Evidence is rather mixed, with most studies reporting larger emotional effects among low-frequency words, especially for those conveying negative content (Kuperman et al., 2014; Méndez-Bértolo et al., 2011; Sheikh & Titone, 2013). Conversely, some studies found either a greater impact of emotion in high-frequency words (Nakic et al., 2006; Scott et al., 2012), or emotional modulations in both low-frequency and high-frequency words

(Kuchinke et al., 2007; Scott et al., 2009, 2014). Despite empirical ambiguity in the direction of the effects, these results provide cues about how emotion-specific lexical mechanisms operate and suggest that early stages of lexical access are influenced by the affective features of words. Similarly, prior reports have shown that the subjective age of acquisition (e.g., adult's estimation about the age at which a word was learnt, Juhasz, 2005) influence the processing of the emotional features of words (Wu et al., 2023). In particular, early relative to late acquired low-arousing words show speeded lexical decisions.

Following a different methodological approach, correlational evidence from normative studies in which participants provide subjective scores for lexico-semantic or affective variables have provided additional support for a link between the emotional features of words and several lexico-semantic variables such as word frequency, subjective age of acquisition, sensory experience (i.e., the set of sensorial modalities associated with a word's referent, Juhasz et al., 2011) or familiarity (i.e., the experience that an individual has with a given word, Juhasz et al., 2015). Words related to positive valence are used more frequently (Montefinese et al., 2014; Monnier & Syssau, 2014; Warriner et al., 2013), tend to be more familiar (Citron et al., 2013; Yao et al., 2017), and are acquired earlier in life (Hinojosa et al., 2016b; Moors et al., 2013). In contrast, high-arousing concepts occur less often in language (Speed & Brysbaert, 2024), are learnt later (Citron et al., 2013) and elicit richer perceptual experiences (Hinojosa et al., 2016b; Warriner et al., 2013).

Of note, the most conspicuous finding in studies dealing with the interplay between language and emotion has been the crucial role of concreteness (i.e., the extent to which a word's referent can be experienced through the senses; Paivio et al., 1968) in the processing of the emotional features of words (Hinojosa et al., 2014; Kanske & Kotz, 2007; Palazova et al., 2013; Yao et al., 2024). Most studies observed that emotion selectively facilitates the processing of abstract words as opposed to concrete concepts (Kaltwasser et al., 2013; Kousta et al., 2009; Ponari et al., 2018). Moreover, adults seem to acquire novel negative abstract words more accurately than novel neutral abstract concepts (Guasch & Ferré, 2021). Furthermore, the results of regression analyses underscore the close link between emotion and concreteness by showing that emotional (both positive and negative) and high-arousing words tend to be more abstract (Altarriba & Bauer, 2004; Ćoso et al., 2019; Hinojosa et al., 2016a; Montefinese et al., 2014; Ying et al., 2024). To account for these findings, Vigliocco and co-authors (Kousta et al., 2011; Vigliocco et al., 2014) aligned with embodied views of cognition to propose that the representation of words denoting concrete objects and actions relies more strongly on sensorimotor information, whereas abstract meaning is preferentially grounded in knowledge gained through emotional experience. Conceivably, abstract words may have more affective associations, eliciting more intense emotions compared to concrete concepts.

In sum, regardless of the theoretical conception of emotions the available evidence argues for a close link between emotion and several components of language, including morphology, orthography, phonology and semantics. Also, it seems that the structure, access and representation of emotional concepts has an idiosyncratic status in the lexicon. A major challenge for the field is to instantiate these data in current models of language (Hinojosa et al., 2023). Some recent attempts like the Affective Language Comprehension model (van Berkum, 2019, 2020) combined evidence from psycholinguistics and the pragmatic analysis of communication to underscore the role of affective features in computing context-dependent lexical representations of the world to understand and generate language that affects other people's behaviour. Also, the PET (Process, Emotion, Task) framework explicitly states that emotion influences the establishment of inferences between unfolding linguistic elements and prior knowledge during reading. (Bohn-Gettler, 2019). The results from the studies summarized here open an avenue to examine different aspects of emotional language in individuals with language disorders given the crucial role of language in communicating emotions during social interactions. Unfortunately, as we shall see in the following sections the interplay between language and emotion has been often neglected in research on language disorders, with only few studies explicitly addressing this relationship.

Processing and use of emotional words in Developmental Language Disorder

The DSM-5 uses the term "Language Disorder" (LD) to describe individuals who face difficulties in language acquisition and use, specifically in the comprehension or production of vocabulary, sentence structure, and discourse (American Psychiatric Association, 2013). Historically, children with such impairments were diagnosed with Specific Language Impairment (SLI). However, further examination of the terminology led to the adoption of the term "Developmental Language Disorder" (DLD) to more accurately describe a condition that emerges during development in which children experience significant and persistent language difficulties not attributed to any known biomedical or neurological condition (Bishop et al., 2016, 2017).

The symptoms of DLD are heterogeneous and can manifest across multiple language dimensions, including phonetic, phonological, morphological, lexical, syntactic, and pragmatic processing (see Leonard, 2017). These impairments significantly impact individuals' daily lives, affecting both social connections and educational progress. Notably, children with DLD often face challenges in social interactions, which can limit their opportunities to learn about and understand others' emotions. Indeed, children's emotional language competence is associated with emotion understanding, awareness, and regulation (e.g., Beck et al., 2012; Ogren & Sandhofer, 2022; Streubel et al., 2020).

Although much research has examined emotional development and language processing separately in DLD populations, few studies have directly assessed how these children process and use emotional vocabulary. Yet, many theories of emotional development emphasize the role of language in shaping emotional understanding (e.g., Hoemann et al., 2019; Lindquist, 2017). This section will explore what is currently known about the recognition, comprehension and use of emotional words in individuals with DLD. Most

often, these topics have been studied using nonverbal cues. However, there's also some evidence from categorization tasks using verbal cues. Findings from all of them help us understand the processing of emotional words in children with DLD.

Many studies have investigated children's ability to recognize and label emotions from facial expressions. While these tasks are not direct tests of emotional vocabulary processing, they provide insight into how well children can access and use emotional words in response to socially meaningful stimuli. For example, Rieffe and Wiefferink (2017) found that preschoolers with DLD were less accurate than typically developing (TD) peers at identifying basic emotions (e.g., happiness, sadness, fear) from drawings of facial expressions. Both groups found sadness and fear more challenging to identify than happiness and anger, suggesting that, in general, lexical access may be modulated by emotional category complexity. Similarly, Delaunay-El Allam et al. (2011) observed that while children with DLD could produce verbal labels for different emotional faces, they were less precise and used emotional labels less exclusively than TD peers. Moreover, while both groups often confused fear with surprise, children with DLD showed a greater tendency to confuse other emotions with overlapping features, such as fear and surprise or anger and sadness. These findings suggest that while the semantic representation of emotions develops over time in all individuals–and the semantic structure of emotion categories is accessible–children with DLD may have greater difficulty generating precise emotional representations, particularly for emotions with overlapping semantic features (see Leonard, 2017).

Importantly, longitudinal work supports a developmental delay rather than a permanent difficulty. Tsou et al. (2023) tested emotion identification in children with DLD and TD peers at two time points: ages 2–5 and 4–7 years. At the first time-point, children with DLD were less accurate than TD peers when asked to point to images depicting emotions (e.g., "Who looks *happy*?"), for both positive and negative emotions. However, by the second time-point, children with DLD performed similarly to TD peers. Notably, children with DLD exhibited a greater increase in the identification of positive emotions as they aged than TD children, suggesting that lexical acquisition for emotion terms may progress unevenly, with valence potentially influencing ease of learning. At the discourse level, Spackman et al. (2006) found that older children (9–12 years) with DLD were more accurate than younger ones (5–8 years) at verbally labeling inferred emotions from contextual scenarios, indicating developmental progression. However, children with DLD continued to perform below TD peers overall, particularly for negative emotions such as fear and anger. These findings imply that while emotional word learning does improve with age in DLD, the trajectory may be slower and more sensitive to emotion type and linguistic demands.

Only a few studies have examined how children with DLD process emotional words directly. To distinguish whether the observed difficulties stem from language impairments or broader emotion-processing deficits, Bahn et al. (2021) addressed this gap using both verbal and nonverbal categorization tasks. In nonverbal tasks children with DLD performed similarly to typically developing (TD) peers when classifying images as human or animal, but showed lower accuracy when discriminating emotional valence in facial expressions (i.e., positive vs. negative faces). For the verbal tasks, –including a lexical decision task (word vs. nonword) and a valence decision task (positive vs. negative word) using auditory stimuli–children with DLD again showed lower accuracy than TD peers, although both groups responded more quickly to real words than to nonwords, and no differences were found across emotional valence categories.

In sum, the literature reviewed in this section suggests that impaired emotional language processing in children with DLD is unlikely to stem solely from difficulties regarding lexical mechanisms, since group differences also emerged in nonverbal emotion discrimination. Instead, they may reflect broader challenges in mapping emotional content onto both linguistic and nonlinguistic representations at early developmental trajectories.

Processing of emotional words in Aphasia

Aphasic syndromes are language disorders caused by brain damage, leading to impairments in speech production, comprehension, reading, and/or writing. Aphasia often co-occurs with other difficulties, including cognitive impairments (e.g., memory loss, slowed processing speed), motor dysfunctions (e.g., ataxia, hemiparesis), or swallowing difficulties (e.g., dysphagia). Based on speech fluency, aphasia is often classified into two broad groups: fluent aphasia (e.g., Wernicke's aphasia, transcortical sensory aphasia, conduction aphasia, or anomic aphasia) and non-fluent aphasia (e.g., Broca's aphasia, global aphasia, mixed transcortical aphasia, or transcortical motor aphasia). However, this is not an exhaustive classification, since symptom profiles vary depending on the type and severity of the lesion, as well as individuals' aphasiological profiles.

Studies on emotional language production suggest that individuals with aphasia often produce emotional words with greater ease than neutral words (Jackson, 1868; Landis et al., 1982, 2006). They also write emotional words more accurately (Landis, 2006) and repeat emotional abstract words more frequently than non-emotional ones (Ramsberger, 1996). However, this advantage disappears when emotional and neutral words differ in concreteness (Bakhtiyari et al., 2015). Interestingly, even though aphasic speech is lexically and syntactically less complex, aphasic and non-brain-damaged speakers use similar constructions to convey emotions (Armstrong & Ulatowska, 2007b). Yet, their emotional vocabulary tends to be less varied and less intense: they generate fewer emotion-laden words, use less intense emotion terms (e.g., *like* rather than *adore*), and often rely on repetition (e.g., *sad*, *sad*) to emphasize emotional intensity (Armstrong et al., 2012; Armstrong & Ulatowska, 2007a; Blonder et al., 2005).

Selective impairments in lexical retrieval of words expressing negative emotions have been observed in aphasic speakers during naming tasks. While neurotypical individuals tend to show reduced performance

for words associated with both negative and positive images compared to neutral ones, aphasic speakers exhibit lower accuracy and slower response times only when naming negative pictures (Blackett et al., 2021; Harmon et al., 2022). Also, Nielsen (2020) examined the performance of aphasic speakers in a confrontation naming task, in which participants had to name the emotion depicted in black-and-white images of positive, negative and neutral valence. To reinforce the emotional salience of the target images, each was preceded by two colored images of the same valence. Naming negative images produced lower accuracy rates compared to naming both positive and neutral pictures, while naming accuracy for positive and neutral images did not differ. Participants also self-reported their emotional responses using the Self-Assessment Manikin rating scale (SAM; Bradley & Lang, 1994), which measures perceived arousal and pleasure. Aphasic speakers reported feeling less positive after the presentation of negative pictures, with more severe aphasia correlating with lower arousal ratings. Specifically, individuals with more severe aphasia reported significantly less arousal than those with mild aphasia, while participants with mild aphasia reported higher arousal following negative images than those with moderate aphasia.

A different line of research has been concerned with the effects of emotion on recognition and comprehension tasks. In general, participants with aphasia perform lexical decision tasks more slowly and less accurately than neurotypical participants (e.g., Moreno et al., 2002). However, both groups show similar emotion effects on word recognition. In this vein, Newton et al. (2020) found that people with aphasia made more accurate lexical decisions for positive words compared to neutral ones, and responded faster to both positive and negative words than to neutral words. These findings are in line with those obtained in studies with neurotypical participants, who respond faster and more accurate to positive than neutral words in lexical decision tasks (Ferré et al., 2024b).

Further research has investigated the processing of emotional words in auditory tasks. Reuterskiöld (1991) observed that individuals with aphasia performed better when matching emotion words to pictures than when matching neutral words. Similarly, Ofek et al. (2013), used event-related potentials (ERPs)–a measure of brain electrical activity at specific time points–to examine auditory processing in a passive listening task. Both neurotypical and aphasic participants showed larger P3 amplitudes for emotional words compared to neutral words, suggesting that emotional word processing remains at least partially preserved in aphasia. However, aphasic participants exhibited reduced N1 amplitudes and delayed P2 and P3 latencies for both emotional and neutral words, suggesting a less efficient auditory and attentional processing.

Finally, specific forms of aphasia, such as primary progressive aphasia (PPA), which causes severe semantic memory deficits (Gorno-Tempini et al., 2011; Joubert et al., 2017), have shown impairments in emotional word comprehension. Hsieh et al. (2012) used a synonym matching task to assess PPA participants' ability to identify which one of two probe words had nearly the same meaning of the target word. No differences in accuracy between emotion and non-emotion abstract words were observed. Similarly, Joubert et al. (2017) investigated the comprehension of concrete, abstract and abstract emotional words using a written semantic similarity judgment task. Participants had to determine which word in a triplet was the less similar to the other two semantically related nouns. PPA participants showed higher accuracy with abstract words compared to concrete ones, with abstract emotional words showing performance in between. Prior research in neurotypical individuals suggest that emotional features are central to the representation of abstract concepts while concrete concepts are more grounded in sensory components. Thus, the data from Joubert et al. (2017) indicates that sensory the features are more degraded than emotional features in PPA individuals.

In this section we have shown that, with few exceptions–such as difficulties in lexical retrieval during word production– individuals with aphasia generally process emotional words in a similar manner than neurotypical individuals. These findings have potential clinical and theoretical implications for aphasia treatment (Blackett et al., 2021; Harmon, 2024), and suggest that the use of emotional stimuli in aphasia treatment may be of help to improve language performance during intervention.

Processing of emotional words in Autism Spectrum Disorder (ASD)

Autism Spectrum disorder (ASD) is a neurodevelopmental condition characterized by impairments in social reciprocity, communication, and the presence of restricted, repetitive behaviors or interest (American Psychiatric Association, 2013). Individuals with ASD often struggle to understand non-literal language such as irony or humor (Pexman et al., 2011; Pijnacker et al., 2009), and may show comorbid difficulties across several language domains, including semantics, syntax, phonology, and pragmatics (Groen et al., 2008, Lartseva et al., 2014). They also frequently have difficulty recognizing and reacting to others' emotions (Scambler et al., 2007). However, these processing deficits are not uniform across individuals or tasks, and may vary depending on the severity of the condition. For example, individuals on the higher-functioning end of the spectrum typically do not exhibit significant language delays, whereas those on the lower-functioning end may remain nonverbal throughout life (Lartseva et al., 2015). Furthermore, emotional processing impairments in ASD might be secondary to difficulties in other cognitive domains, such as attention or memory (Nuske et al., 2013). Critically, numerous studies have shown that both children and adults with ASD experience difficulties in recalling, identifying, or using emotion words (Grossman et al., 2000; Smith et al., 2010).

Unlike neurotypical controls–who tend to recall emotional words more readily than neutral ones–individuals with ASD often do not show such memory advantage (Beversdorf et al., 1998; Dolcos et al., 2004), particularly when recall is delayed. For instance, Gaigg and Bowler (2008) asked typically developed (TD) and ASD adults to memorize emotional and neutral words and recall them at three time points: immediately, after one day, and after one week. While TD participants consistently recalled emotional words better than neutral

ones at all time points, individuals with ASD only showed this advantage during immediate recall, with no advantage at the later time points (see Beversdorf et al., 1998 for similar results in emotional sentences). These emotional linguistic impairments have often been associated with abnormal patterns of attention and memory performance (Lartseva et al., 2014). Such results could suggest that individuals with ASD may either fail to perceive emotional content as salient, or struggle to encode them effectively at later stages of processing (Beversdorf et al., 1998; Gaigg & Bowler, 2008; but see South et al., 2008).

Current evidence suggests that individuals with ASD perceive emotion in a way that differs from neurotypical individuals during word comprehension. In this line, Wong et al. (2022) asked English-speaking ASD adults to rate the emotional valence and arousal of words using a 9-point rating scale. While people with ASD ranked stimuli similarly to controls, they used a more restricted range of the valence scale, indicating a more limited representation of emotional experiences through language. Furthermore, affective priming studies have revealed reduced priming effects for negative words, while larger effects for positive words in ASD compared to TD controls (Lartseva et al., 2014).

Electrophysiological and neuroimaging studies provide further insights. In an ERP lexical decision study, Lartseva et al. (2014) found that both TD and high-functioning ASD adults responded faster and more accurately to emotional words than neutral words, suggesting that the basic processing of emotional words may be similar in both groups. Nonetheless, only neurotypical participants exhibited reduced N400 amplitudes for emotional words compared to neutral words, along with an emotion effect in the late positive component (LPC) for negative words compared to neutral and positive words. Similarly, Yeh et al. (2024) found that children and adolescents with ASD (aged 11-14) showed attenuated LPC emotion effects for positive emotion-laden words (e.g., *birthday*) compared to TD participants in an explicit emotion categorization task. The LPC component has been related with controlled and elaborated processing of emotion words (Hinojosa et al., 2020a). Thus, these findings suggest that individuals with ASD may lack the enhanced top-down processing typically associated with the comprehension of positive words. Finally, in a functional magnetic resonance image (fMRI) study, Han et al. (2014) asked ASD and TD adolescents to identify negative words embedded in a string of three pleasant words. Compared to controls, participants with ASD showed lower accuracy and enhanced activation in the fusiform gyrus while identifying negative words. This suggests greater cognitive effort in processing negative emotional words.

Studies on verbal production of emotional language have also shown that during spontaneous dialogues people with ASD are less likely to mention emotions, describe emotional states, or describe others' emotional states in conversation compared to typically developed individuals (Adams et al., 2002; Barnes et al., 2009; Capps et al., 2000; Müller & Schuler, 2006). Most research has examined children's narratives describing the emotional states of characters in pictures or vignettes. Findings regarding the use of emotional terms are mixed. For instance, Siller et al. (2014) asked ASD and TD 6-year-olds, matched on IQ and vocabulary, to describe the internal states (i.e., thoughts and emotions) of characters depicted in stories. Children with ASD were less likely to report the emotions felt by the characters than TD children, although both groups used a similar number of cognitive terms. Similarly, Teh et al. (2018) found that children (ages 8-12) and preschoolers (ages 5-6) ASD produced fewer emotional descriptions than TD controls when describing images of different emotional valences. Of note, older children produced more emotional words than younger children in both groups, suggesting developmental effects. In contrast, Rumpf et al. (2012) did not observe differences in internal state language between 8-12-year-old children with ASD and neurotypical children. These findings suggest that the use of emotional terms in storytelling may depend on the emotional valence of the words used, although the results remain inconsistent: some studies have reported that children with ASD produce full descriptions of positive feelings and impaired descriptions of negative internal states (Ben-Itzchak et al., 2016)–in line with the advantage for the acquisition and processing of positive words observed in TD children (Sabater et al., 2023). Other studies, however, found the opposite pattern–increased production of negative over positive emotional terms (Rumpf et al., 2012; Teh et al., 2018). This negativity bias has been observed in both children and adults and could be related to the emergence of adaptive responses to cope with aversive information (Balconi et al., 2012).

In summary, individuals with ASD exhibit challenges across multiple aspects of emotional language, including recalling the representation of the emotional features of words, describing affective contextual cues depicted in cartoons, or allocating voluntary attention to the emotional content of words. However, existing research is limited and sometimes contradictory. Further efforts are needed to investigate whether these impairments arise from a general deficit in affective processing, or they rather emerge from specific language-related difficulties.

Discussion

In recent years our knowledge of emotional language processing in TD individuals has flourished greatly. Research has shown that emotion impacts all aspects of language, from sublexical levels to pragmatics, particularly when understating language trough reading. In contrast, knowledge about the use and processing of emotional language in people with communication-related disorders remains limited. However, as outlined in this paper, emerging evidence indicates that individuals with DLD, aphasia, or ASD experience selective impairments in comprehending and generating utterances conveying emotions. These findings open new avenues for future research, as well as for the assessment and intervention in speakers with language impairments.

Research on DLD suggests that these individuals are impaired in generating precise lexical-semantic representations, which could contribute to their challenges in emotional language processing. In particular, there is evidence suggesting that they experience troubles to map language labels onto stimuli displaying emotions (e.g., faces, vignettes). These difficulties possibly arise from a general deficit in discriminating emotions like surprise and fear. While the trajectory of emotional word development is similar for both TD and DLD children, those with DLD seem to face greater challenges in labeling and attributing emotions with overlapping semantic features compared to their TD peers. These results underscore the importance of fostering an environment that supports emotional language learning for children with DLD (e.g., Wright et al., 2017; see Rinaldi et al., 2021 for a review).

Regarding aphasia, there is data indicating that some aspects of the ability to perceive and comprehend emotional language remain intact in aphasic individuals. These include the repetition of emotional words, or the access to lexical information when reading (Borod et al., 2000; Landis et al., 1982; Newton, 2020). This may reflect the preserved capacity of the right hemisphere to process emotional cues in aphasic individuals, who typically show left hemisphere damage (Landis, 2006). Of note, these effects are influenced by confounding factors, such as the lexical-semantic properties of the words, or concreteness (Bakhtiyari et al., 2015). These findings align with embodied theories which assume that the representation of words with abstract conceptual referents is grounded in emotional features since they lack sensory referents (Vigliocco et al., 2014). This is just a good example of how research from people with communicative impairments can inform theories about conceptual word representation. When it comes to word production, aphasic individuals often produce words with lower emotional intensity, or less syntactically complex utterances compared to neurotypical individuals (Armstrong et al., 2012; Blonder et al., 2005). They also show a selective impairment during the generation of words denoting negative concepts. In line with the predictions of the Distraction Hypothesis, this selective impairment may arise from an attempt to regulate the activation of negative emotions and disengage attentional resources from negative content prior to the word production task (Blackett et al., 2017).

Studies examining emotional language use and comprehension in children with ASD have yielded inconsistent results. This is especially evident when they use of internal state language denoting feelings through dialogues and storybook narratives. These discrepancies may arise from differences in participants' age, cognitive abilities, or the specific features of emotional words used in different studies (Begeer et al., 2008; Teh et al., 2018). While some studies observed a similar use of emotional terms in ASD and TD children (Rumpf et al., 2012), others point to the existence of an ASD-specific deficit in the use of language conveying affective states and experiences (Siller et al., 2014). For adults with ASD, studies indicate a limited representation of emotional experiences through language (Wong et al., 2022), and impaired top-down processing of affective content of language (Yeh et al., 2024). These findings suggest that people with ASD have troubles in decoding emotional concepts and interpreting context-sensitive cues when describing feelings and internal states. We tentatively suggest that these difficulties may reflect an impaired mapping of emotional concepts to real-world referents during language acquisition and development. This claim aligns with the assumptions of the Weak Central Coherence Theory (Happé & Frith, 2006). According to this view, whereas neurtypical individuals show "central coherence" that is, they tend to pull information together to process information in context, individuals with ASD face difficulties in integrating various sources of information to contextualize and extract global meaning. This ability is thought to be fundamental to acquiring and organizing conceptual representations (Happé, 2021).

The evidence reviewed above highlights the influence of emotion on language processing and use in individuals with disorders that affect their communication. However, this topic remains largely unexplored in individuals with Specific Learning Disorder (SLD), particularly those with impairments in reading and/or writing, such as dyslexia. Dyslexia is characterized by poor accuracy and/or fluency in reading, often accompanied by difficulties in spelling and decoding. The cognitive mechanisms underlying various levels of language processing have been widely studied in dyslexics. These include orthographic processing (e.g., Boros et al., 2016; Kirkby et al., 2021), morphosyntactic processing (e.g., Cantiani et al., 2013), or prosodic processing (e.g., Álves et al., 2015; Cuetos et al., 2018; Suárez-Coalla et al., 2016). However, the potential impact of emotional features on these language components remains largely unexplored.

As we showed here, current research has shown that emotion can influence all these linguistic levels, particularly during reading (Ferré et al., 2025). However, there is data indicating that verbal fluency which is impaired in dyslexics is modulated by emotion in TD individuals. In this line, they show enhanced performance for emotional compared to other semantic categories during verbal fluency tasks (Sass et al., 2013). Also, although research on the influence of emotion on writing might be particularly suitable for research and the assessment of dyslexia data from TD individuals is very scarce. Nonetheless, it has been shown that individuals report feelings of boredom and engagement/flow when writing about both emotional and non-emotional topics (D'Mello & Mills, 2014). Of note, it seems that individuals with dyslexia may experience some difficulties when processing emotion, particularly when interpreting facial expressions of emotion (e.g., Whiting & Robinson, 2001). Yet, studies directly examining how individuals with dyslexia process and use emotional language remain marginal. The limited available evidence suggests that emotional content may facilitate reading comprehension in dyslexic individuals (Lesniak et al., 2021). Therefore, further research is needed to determine whether affective features of words modulate any stage of the reading and writing process. This gap raises important questions about the potential use of emotional stimuli in interventions designed to support reading or writing skills in individuals with dyslexia. Investigating how this population processes emotional language could also help to refine theories of emotion–language interaction in developmental disorders.

Language is a privileged vehicle to express emotions in daily life. During interpersonal interactions, people use words to convey emotional concepts, express their internal affective states, or add emotional connotations to the semantic referent of a given word (Fiehler, 2002). Thus, impairments in generating and understanding emotional language can significantly affect social interactions involving individuals with language impairments. The research reviewed here indicates that, depending on the disorder, individuals may struggle to interpret other's feelings, decode emotional communicative intentions, or express their own emotional experiences. These limitations may hinder their ability to assess the relevance of emotional cues and create affective meaning through joint actions with others. As a consequence, they might often experience diminished social competence and well-being.

The findings summarized here underscore the importance of considering emotional language when assessing comprehension and production breakdowns, or when designing therapeutic interventions. One crucial step is the development of well-controlled materials for assessing emotional language competences. This could be of help in establishing a baseline performance and identifying relative strengths. These materials could also assist in the transfer of skills to real-world settings during rehabilitation. Among others, factors such as the psycholinguistic features of words, stimulus presentation rate, personal relevance, and contextual cues should all be considered (Basso, 2003). It is also important to acknowledge that the use of emotional stimuli may induce emotional states in patients. This may potentially affect their performance in assessment and therapy.

Speech therapy interventions for language-related disorders often rely on intact abilities and functions (Arellano et al., 2021). Thus, the preserved aspects of emotional language processing can be used to optimize interventions, since they are involved in the interpretation of prosody, humor, or the emotional connotation of words (Alessio, 2021). For instance, Melodic Intonation Therapy (Zipse et al., 2012) encourages patients to produce sentences in a singing-like manner with exaggerated prosody while tapping on each syllable with the left hand to stimulate the right hemisphere (Zumbansen et al., 2014). It has been used successfully to treat aphasia, but more targeted interventions that specifically focus on emotional content (e.g., integrating emotional prosody or emotional vocabulary) may hold promise for enhancing therapy outcomes. In this vein, language comprehension and repetition has been observed to increase when emotional stimuli are used in treatment (Gyorfi, 2017).

An additional key direction is the design of interventions specifically aimed at improving the ability to communicate and understand emotions, considering their impact in social interactions. Along this line, Avila (2019) used storybook-based therapeutic strategies focusing on character emotions (e.g., emotion discussions, re-enactment, or recognition of emotions from picture cards) to improve the ability of children with DLD to acquire and understand emotions. Expanding emotional vocabulary has a positive impact in affective functioning. Indeed, a richer emotional lexicon correlates with more nuanced emotional experiences (Vine et al., 2020). This aligns with the claims of constructivist theories of emotion about the role of language in shaping how people interpret emotions (Barret & Lida, 2024).

The present review also brings to our attention underexplored areas that may help us to fully understand emotion language processing in individuals with communication-related difficulties. For instance, most research on emotional language processing in these populations has been conducted in Western cultures. This limits our understanding of how culture influences emotional language processing. Indeed, there is evidence indicating emotional processing differences across cultures, specifically between individualistic and collectivistic ones (Basnight-Brown & Altarriba, 2018). Hence, research on emotional language in diverse linguistic and cultural contexts is necessary to develop not only a more general understanding of such processing, but also universally applicable assessment tools and intervention strategies.

Moreover, the integration of technological innovations in research, assessment, and intervention regarding emotional language processing holds significant potential. For instance, artificial-intelligence-based tools could provide more detailed assessments of emotional language use, as they can analyze emotional content in speech or written language in real-time (Jadhakhan et al., 2022). Furthermore, virtual and augmented reality technologies could create immersive environments that simulate real-world emotional situations and social interactions (Marín-Morales et al., 2020). This could be used in therapeutic settings to expose individuals with difficulties in such situations allowing them to practice their emotion recognition and expression skills.

In conclusion, most research on the processing of emotional language relies on reading, hearing, and oral production tasks. However, the effects of emotion in other linguistic domains (e.g., writing) remain less understood, even if they may offer critical insights in our understanding of language impairments. Current evidence indicates that some aspects of the processing of emotional language are preserved in people with communicative disorders like DLD, aphasia, or ASD. However, they also experience some difficulties in understanding and communicating emotions trough language in areas like the mapping of emotional word labels onto their conceptual referents or the identification of emotional words. The implications of these findings extend beyond linguistic competence, influencing interpersonal relationships with their peers, or emotion perception and self-regulation. Thus, it is critical to expand research efforts to better understand how individuals with impaired communication skills use emotional language. Despite increasing our theoretical knowledge on this topic, research within this domain will serve as a pillar to develop effective speech-therapy interventions aimed to improve not only language skills but also social and affective well-being (Harmon, 2024).

Authorship declaration: Celia Martínez-Tomás: Article conceptualization; Data collection; First draft writing; Methodology; Writing revision draft.

Ana Baciero: Article conceptualization; Data collection; First draft writing; Methodology; Writing revision draft.

José Antonio Hinojosa: Article conceptualization; Data collection; First draft writing; Methodology; Writing revision draft.

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