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Joint effect of alexithymia and mood on the categorization of nonverbal emotional vocalizations

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ABSTRACT

The role of stable factors, such as alexithymia (i.e., difficulties identifying and expressing feelings, externally oriented cognitive style), or temporary factors, such as affective states (mood), on emotion perception has been widely investigated in the literature. However, little is known about the separate or joint effect of the alexithymia level and affective states (positive affectivity, negative affectivity) on the recognition of nonverbal emotional vocalizations (NEV) (e.g., laughs, cries, or sighs). In this study, participants had to categorize NEV communicating 10 emotions by selecting the correct verbal emotional label. Results show that the level of alexithymia is negatively correlated to the capacity to accurately categorize negative vocalizations, and more particularly sad NEV. On the other hand, negative affectivity appeared negatively correlated with the ability to accurately categorize NEV in general, and negative vocalizations in particular. After splitting the results by the alexithymia level (high vs. low scorers), significant associations between mood and accuracy rates were found in the group of high alexithymia scorers only. These findings support the idea that alexithymic features act across sensory modalities and suggest a mood-interference effect that would be stronger in those individuals.

1. Introduction

One of the most predominant activities we perform in our daily lives, as social beings, is communication, in which emotions are a crucial component. However, the ability to process and recognize emotional signals can vary greatly from one person to another, or even from one moment to another. In other words, the capability to identify our own and others' emotional states can be altered in a stable manner (e.g., by a personality trait) or temporarily (e.g., by a mood state).

Among stable factors that can impair emotional functioning, alexithymic traits have generated a lot of interest over the last decades. Alexithymia is a multifaceted construct that includes difficulties with identifying feelings and distinguishing between feelings and the bodily sensations of emotional arousal, difficulties in describing feelings to others, and a cognitive style that is literal, utilitarian, and externally oriented (Taylor et al., 1997). These cognitive and affective characteristics were initially observed among patients with classic psychosomatic diseases and were later seen in other psychiatric patients (Taylor et al., 1997). Moreover, alexithymia has to be understood as a disability (i.e., on a continuum, even in the general population as a trait variable) in emotional processing, and as described recently, this view receives increasing evidence from laboratory research (Lumley et al., 2007). Indeed, a growing body of empirical work about the cognitive deficits in the processing of emotional information in high alexithymia scorers (HA) is now emerging. Up to now, the observed impairments in emotion recognition were mainly found using negative emotions (e.g., anger and sadness). Most previous studies have involved visual stimuli like emotional facial expressions (EFE), pictures, videos or words (Berthoz et al., 2002; Franz et al., 2004; Meriau et al., 2006, 2009; Nielson and Meltzer, 2009; Pollatos and Gramann, 2011; Ridout et al., 2010; Vermeulen and Luminet, 2009; Vermeulen et al., 2006, 2008). For example, HA have been found to be less efficient in detecting fearful, sad and

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angry faces, and tend to rate fearful faces as less intense than individuals with a lower level of alexithymia (LA) (Prkachin et al., 2009). Despite the importance of emotions conveyed through the auditory channel in social interactions, few studies have examined their processing in alexithymia (Goerlich et al., 2012, 2011, 2013; Schafer et al., 2007; Swart et al., 2009; Vermeulen et al., 2010). Some of these studies linked deficits in the identification of affective prosody to a high level of alexithymia. Among these studies, alexithymia was found to modulate electrophysiological responses to emotional information from speech prosody, suggesting an automatic affective processing deficit in HA (Goerlich et al., 2012, 2011) associated with reduced activation in the right superior temporal gyrus and amygdala during affective prosody categorization (Goerlich et al., 2013). Furthermore, HA tended to respond slower than LA when they had to categorize an emotion conveyed by the tone of a spoken sentence (with an incongruent emotional content) (Swart et al., 2009), and HA made more errors in identifying disgust expressed through nonsense syllables spoken in an emotional intonation (Goerlich et al., 2012). However, to date, only one study (Heaton et al., 2012) has investigated these alexithymic features using nonverbal emotional vocalizations (NEV) (e.g., laughter, sighs, wails, cries, and groans) (see e.g., Sauter and Eimer, 2010; Sauter et al., 2010; Sauter and Scott, 2007; Scott et al., 1997) and found a reduced ability to categorize NEV (i.e., happy, sad, anger, surprise, fear and disgust) associated to the level of alexithymia. Nonetheless, studies with this type of auditory stimulus would hold a substantial ecological validity, since NEV, along with emotional facial expressions, are commonly encountered in social interactions (i.e., to communicate emotional states) and are free of verbal bias (i.e., "only" emotional). Furthermore, most previous studies either focused exclusively on negative emotions or included one positive emotion, like happiness (i.e., a smiling face). As such, the use of NEV enables the examination of how alexithymia influences emotion processing with a variety of negative (e.g., fear, disgust, anger) and positive (e.g., sensual pleasure, relief, amusement) stimuli, representing different discrete emotional states across the valence spectrum.

Aside from trait-based deficits, individuals may encounter difficulties in the identification of others' emotions only in particular contexts. Among the factors composing such conditions are transient affective states. Indeed, more generally, the way attention is allocated seems to be influenced by mood (Jefferies et al., 2008; Vermeulen, 2010). More specifically, in studies on non-clinical populations, mood or state affect has consistently proved to influence the way emotional information is processed (Bouhuys, 1995; Chepenik et al., 2007; Egidi and Nusbaum, 2012; Herr et al., 2012; Lee et al., 2008; Lim et al., 2012; Niedenthal et al., 2000, 1997; Schmid and Schmid Mast, 2010). Most studies report a mood-congruency effect, acting as a filter in the perception of emotional stimuli and biasing the assessment congruently with the mood state. For example, studies using ambiguous emotional facial expressions (EFE) have showed that individuals who had been induced to be in a sad mood had a biased perception toward sadness or negative emotions in comparison to individuals in a happy or neutral mood condition (Bouhuys, 1995; Lee et al., 2008). Moreover, in a study using video clips of blended EFE (sequences of faces from emotionally intense to neutral), Niedenthal et al. (2000) found that mood-congruent emotional expressions were perceived to persist longer than the mood-incongruent ones. This congruency bias induced by mood states has been found at the neurophysiological level for auditory stimuli as well. Egidi and Nusbaum (2012) analyzed EEG recording of N400 peaks (indicators of effort of information integration) during the processing of sentences ending with emotional content. Their results showed that individuals reacted, according to their mood, to the incongruence of the stimuli by demonstrating larger peaks (e.g., for a negative ending while in a happy mood). In contradiction with the mood-congruency effect, stated both in behavioral and neurophysiological studies, Chepenik et al. (2007) found a *general impairment*, during an EFE categorization task (i.e., anger, fear, sad, happy, neutral) when individuals were induced to be in a sad mood (vs. neutral). As emphasized by Schmid and Schmid Mast (2010), this inconsistency may be due to a methodological difference. Indeed, Chepenik and her colleagues used a categorization task with discrete emotions as categories (vs. intensity judgments or valence categorization in other studies), requiring more complex and analytical processing, thus limiting comparisons with the other studies. Overall however, these studies appear relatively homogenous in their methodologies. Firstly, mood states were generally induced and not merely measured, possibly reducing the ecological validity of these studies (i.e., not based on naturally occurring mood states). Secondly, the type of induced mood was preferentially sadness instead of other negative emotional states (e.g., anxiety, anger), which might influence emotional processing differently. And thirdly, the stimuli used were almost exclusively visual (except for spoken sentences in Egidi and Nusbaum, 2012), leaving unexplored the effect of mood on other types of emotional stimuli (e.g., NEV). This narrowness in the literature about mood effects on emotion perception appeals for new investigations to address these gaps.

Mood effects on emotion perception might also be influenced by personal lineaments Indeed interactions between personality traits and mood in affective information processing have been reported in several studies (Rusting, 1998). For example, in an affective word evaluation task (i.e., emotional vs. neutral), Tamir and Robinson (2004) found an interaction between neuroticism and negative mood. Indeed, individuals with high neuroticism and negative affectivity showed greater performances (faster reaction times) than high neuroticism scorers who were low in negative affectivity, whereas the opposite pattern was found for individuals low in neuroticism. Despite the fact that mood states are related to alexithymia (i.e., more negative affect, less positive affect) (De Gucht et al., 2004; Parker et al., 2005; Vermeulen et al., 2007), to our knowledge, no study on the interaction between alexithymia and state affect during emotion processing has been conducted yet.

In this study, we examine whether alexithymia level and current mood state (subdivided into positive and negative affectivity) are linked to the ability to accurately identify nonverbal vocalizations of emotions (NEV). Similar to the impairments seen in the literature on the recognition of emotions from faces and voices, we hypothesized that alexithymic features should be associated with a reduced capacity to accurately recognize emotions from vocalizations, and particularly negative ones. We also expected to find a modulation of the performance on the NEV categorization task in relation to the scores on the mood scale, with a general impairment related to a high level of negative affectivity. Finally, we expected to find this pattern of mood effect enhanced in high alexithymia scorers (i.e., HA vs. LA). With the use of nonverbal auditory stimuli representing a large panel of negative and positive emotions, and of validated measures of alexithymia and general mood state, this study aimed at testing claims from the literature in a broadened experimental setting.

2. Methods

2.1. Participants and materials

Fifty-seven French speaking undergraduate students (from different university departments) or volunteers (78.9% female, age: $M=24.23$; S.D.$=8.26$) were tested individually. Task and stimuli were taken from Sauter et al. (2010) and consisted of nonverbal vocal expressions of 10 emotions (i.e., achievement/triumph,