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Olivier Luminet
UCLouvain

Kristy A. Nielson
Marquette University, kristy.nielson@marquette.edu

Nathan Ridout
Aston University

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Having no Words for Feelings: Alexithymia as a Fundamental Personality Dimension at the Interface of Cognition and Emotion

Olivier Luminet
Research Institute for Psychological Sciences, UCLouvain, Louvain-la-Neuve, Belgium
Fund for Scientific Research (FRS-FNRS), Brussels, Belgium
Kristy A. Nielson
Department of Psychology, Marquette University, Milwaukee, WI
Department of Neurology, Medical College of Wisconsin, Milwaukee, WI
Nathan Ridout
Department of Psychology, School of Life & Health Sciences, Aston University, Birmingham, UK

ABSTRACT

This special issue brings together two important reviews and seven cutting-edge empirical papers concerning the influence of alexithymia on cognitive and emotional processing. Alexithymia is a multifaceted construct that is characterised by difficulties identifying one's feelings; difficulties describing one's feelings to others; and an externally focused, utilitarian cognitive style. In this paper, we begin by considering how emotion science has

evolved in its understanding of personality traits, before highlighting the potential importance of alexithymia research for the field of cognition and emotion. After summarising the historical context of alexithymia research, we consider the contributions of the featured papers to the literature of cognition and emotion. The collected works highlight that alexithymia influences several aspects of how one perceives and responds to neutral and emotional situations, by impacting upon multiple processes (attention, appraisals, memory, language and behaviour), showing the importance of drawing better connections amongst multiple processes, toward disentangling the effects of early processes on later ones. A lack of correspondence between processes, as well as amongst alexithymia facets, is another central finding of the special issue. This pattern is thought to lead to ineffective and inflexible emotion regulation and to pose significant risks for physical and mental illness.

KEYWORDS:

Alexithymia, attention,– appraisals,– behaviors,– memory,– language, emotion regulation

The field of cognition and emotion has led to major advancements in understanding the importance of detecting, identifying, understanding, labelling and regulating emotions (see Koole & Rothermund, 2019). These functions represent a complex interplay of developmental, experiential and cognitive processes that are fundamental to adaptive individual and social functioning. As a complementary perspective, the study of disruptions of emotion processing is also key to understanding the role and meaning of emotions in everyday life. The aim of this special issue is to examine the cognition–emotion interface through the lens of disrupted emotion processing in alexithymia, which literally means having no words for one's feelings. More specifically, alexithymia is a multi-dimensional personality construct that has three major facets, (1) difficulty identifying one's feelings and distinguishing them from bodily sensations; (2) difficulty describing one's feelings to others; and (3) an externally oriented cognitive style, that is utilitarian and without including affective responses when facing stressful situations (Taylor et al., 1997; 2016).

We begin by showing how emotion science has evolved in its understanding of personality traits, and then highlight what can be learned about the cognition–emotion interface from experimental research on alexithymia. In the second section, we situate the evolution of alexithymia research in the historical context of psychosomatic medicine and overview the early research on the construct. In the third section, we provide a review of the papers that are part of this special issue and their contributions to both the literature on alexithymia and to understanding the cognition–emotion interface. In the final section, we highlight dissociations in emotion processes that were revealed by the papers in this issue, and discuss the ways in which the heterogeneity of functioning in alexithymia can inform future studies and theory about the cognition–emotion interface.

1. Personality and the cognition–emotion interface

Emotion psychology has evolved considerably in explaining the role of personality traits in emotion processing (Kuppens et al., 2009). Initially, personality theories of emotion focused on traits reflecting general tendencies to experience certain emotions with higher or lower intensity and/or frequency. This approach obscured the emotional processes underlying the trait(s) because each trait is more likely to manifest in situationally specific ways (Mischel & Shoda, 1998). Current perspectives adopt an explicit interactionist framework, which assumes that individual differences in emotional responses are explained by the concomitant effects of the person (including his/her antecedents or history), the situation (including its novelty or controllability) and time (including updating as a function of changes in both context and person) (Kuppens et al., 2009). One important goal of this approach is therefore to identify the conditions under which individuals with higher scores on a specific trait like alexithymia evidence modulations in their emotional responses.

The goal of identifying conditions where alexithymia results in modulated emotional response fits perfectly with a process-oriented approach that has recently been developed in personality psychology (Quirin et al., 2020; Robinson et al., 2019). In the Dynamics of Personality Approach (DPA), Quirin et al. (2020) emphasise the need for investigating personality processes in an integrated manner, involving large classes of psychological functions that include cognitive and emotional dimensions. DPA models involve objective measures explaining how different functions interact for producing cognition, emotions and behaviours. Following the perspective developed by Shoda and Mischel (2000), these new approaches contend that within-person variations across different types of stimuli (e.g. emotional and neutral) are essential for understanding information processing (Quirin et al., 2020; Robinson et al., 2019). Furthermore, a central aspect is that mechanisms involved in personality traits can be modelled through the use of cognitive and behavioural tasks that directly investigate processes such as attention, perception, appraisals, cognitive control or behaviours (Robinson et al., 2019). These new approaches integrate the descriptive richness of the trait perspective with the explanatory power of process-oriented models. The goal is to capture personality tendencies in vivo together with high degrees of experimental control to provide explanatory frameworks of the personality process (Baumert et al., 2017).

The field of cognition and emotion is also essential in illuminating and empirically validating the clinical significance of emotion. Perhaps most important is the translation of experimental paradigms from cognitive psychology to study the processing of emotional information in clinical disorders (Oatley et al., 2011). A major contribution of clinical cognition–emotion research has been the development of tasks that reveal and characterise information processing of emotion, and specify the distinct features of those with emotional disorders, particularly when salient material is applied (Joormann, 2019).

The central aim of this special issue is to advance the scientific understanding of how alexithymia alters emotional processing. To do so, cutting-edge studies are presented that employ novel empirical approaches to characterise which processes of the cognition–emotion interface are crucially involved. Several papers specifically examine information processing paradigms and sensitivity to salient material. The special issue represents two particularly compelling shifts in this literature. First, these studies examine what can be learned about the cognition–emotion interface from experimental research on alexithymia and in so doing, they challenge alexithymia research on the very nature of the emotional response. From the early work in the 1970s, the dominant perspective was to view alexithymia as an overall *deficit* of emotion processing (e.g. Sifneos et al., 1977; Taylor, 2000). While this view is occasionally challenged by findings showing *excessive* emotional responding, there is a lack of empirical research or integrative theory that intentionally distinguishes the conditions and contexts under which different, nuanced responses occur. Moreover, these distinctions are of critical importance for the cognition–emotion literature, illustrating previously overlooked nuances of emotional responding and dysfunction, and potential dissociations in emotional responding that need clarification. These clarifications are likely to have fundamental influences on the understanding of emotion processing. The papers in this special issue give attention to specifically evaluating these distinctions.

A second substantial shift that this special issue reveals is the beneficial role of a facet level analysis toward better understanding the nuances of alexithymia, and through it, the cognition–emotion interface. Although most studies have examined alexithymia as a unitary construct (i.e. using the total score), recent studies have given much more attention to evaluating the influence of individual facets of alexithymia through subscale scores. Total scores remain preferred for clinical purposes (Reise et al., 2013). However, for research purposes, considering facet scores allows clearer identification of which processes are particularly related to specific alexithymia features, and thus, how those features might influence individual's mental and somatic vulnerabilities.

All except one of the empirical papers in this special issue adopted a facet-level analysis, and the review by Luminet et al. (2021) combined a facet-level analysis with a process perspective. Their findings provide clear

support for important differential influences of the facets on specific processes, as well as indicating dissociations in emotion processing effects in alexithymia. Thus, immersion in the theoretical and empirical paradigms of cognition and emotion using such an approach can substantively broaden understanding of the fundamental processes underlying alexithymia. Furthermore, these studies of alexithymia highlight the benefits of process-level analyses in more generally understanding emotion processing, particularly in delineating when and under what conditions (e.g. affective vs. non-affective) dissociations occur.

Although systematic research examining the cognition–emotion interface did not begin until the mid 1990s, the foundations of alexithymia and the study of the clinical significance of emotion are rooted in earlier work. Yet, it was not until the mid-1990s that validated assessment of alexithymia became broadly available. Thus, the two fields evolved rapidly and in the same era. We next provide an overview of this historical context in alexithymia to set the stage for understanding how the papers in this special issue fit within this context and how they advance it.

2. Alexithymia research: from clinical observations to controlled experiments

The notion of alexithymia originates with the observation that people with specific somatic diseases were unable to experience and identify their emotions as subjective feelings, had a lack of fantasies about feelings and instinctual drives, and exhibited a preoccupation with external events (e.g. Groddeck, 1923; Wittkower, 1938). These observations were the foundational steps of psychosomatic medicine. The 1940s' ushered in more systematic emotional and cognitive observations of these individuals, with the basis for somatic disease attributed to unconscious psychological conflicts (Alexander, 1950) or stunted development of personality and symbolic expression (Ruesch, 1948). MacLean (1949) proposed psychosomatic illnesses occur through physiological stress resulting from deficits in verbal emotion expression. Subsequent study further described psychosomatic patients as lacking introspection and fantasies (Horney, 1952; Kelman, 1952), with a utilitarian, concrete way of thinking (i.e. “pensée opératoire”; Marty & de M’Uzan, 1963). Overall, these clinical reports indicated a pattern of symptoms including disturbed verbal and symbolic emotion expression, low imaginative ability, and a tendency toward solving stressful situations by physical action instead of mentalization. In the early 1970s, Nemiah and Sifneos (1970) systematized these observations and drew direct links between difficulty perceiving, understanding, describing and expressing feelings and proneness for various somatic diseases. A turning point came when Sifneos (1973) coined the term “alexithymia” and began testing its validity and using methods for assessing its severity.

Most of the research in the following two decades focused on understanding somatic illness, and physiological and behavioural responding during emotion, but progress was impaired by the lack of a reliable instrument to assess alexithymia severity. By the mid-1990s, however, a first carefully researched instrument became available that allowed valid assessment of alexithymia, which is now the most widely used assessment scale (TAS-20; Bagby et al., 1994a, 1994b; see Luminet et al., 2021, this issue, for a review of the current knowledge regarding TAS-20 validity). The initial research on alexithymia specifically examined the relationship of alexithymia with somatic illness (e.g. Parker et al., 1993a; Schmidt et al., 1993), suggesting vulnerability to illness in alexithymia through deficits in the cognitive processing of emotions (Taylor, 2000; Taylor et al., 1997) and the arrested development of affective regulation and interpersonal outcomes (e.g. Krystal, 1988). Other studies examined dissociation (i.e. “decoupling”) of physiological from cognitive-experiential components of emotional responses (e.g. Papciak et al., 1985), neurobiological bases of alexithymia (e.g. Hoppe & Bogen, 1977; Lane et al., 1998), and interventions aimed at reducing alexithymia (e.g. Beresnevaite, 2000).

Although there were attempts in early alexithymia research to address the cognition–emotion interface (Mann et al., 1994; Parker et al., 1993a, Parker et al., 1993b), the studies were limited by small samples and the lack of a valid alexithymia assessment instrument. In 1997, Taylor et al. highlighted the need for a shift towards studies

examining the cognition–emotion interface in order to fully understand the underlying mechanisms involved in high alexithymia scores: “Investigations that systematically evaluate differences in attention, retrieval, recognition, and recall of emotional and non-emotional stimuli have the potential to delineate more clearly the mechanisms underlying failures in affect regulation” (p. 268). By definition, each facet of alexithymia characterises disturbance of the interaction between cognitive and emotional processes. Nevertheless, it is only in the last 25 years (1995–2020) that more systematic research, using methods and tools originating in cognitive psychology, has begun to elucidate the specific pattern of impairments associated with alexithymia.

This new line of research has examined the types of processes and the degree of deficits in the processing and regulation of emotions associated with alexithymia severity. Those data helped to reveal the complex (and possibly causal) links between mechanisms underlying the central facets of alexithymia and subsequent negative mental and physical health outcomes. They also contributed to defining some of the specific circumstances in which the impairments happen. For instance, studies revealed that people scoring higher on alexithymia exhibit emotion processing deficits particularly when task difficulty is increased, such as under short time constraints or degraded stimulus quality (e.g. Ihme et al., 2014a, 2014b; Kätsyri et al., 2008; Prkachin et al., 2009). Deficits might also be dependent on the type of material used. If we consider the ability to detect, identify and recognise emotions in oneself and others, deficits in alexithymia mainly occur for negative states such as anger, sadness or fear (Luminet & Zamariola, 2018). Yet, the specific papers included in this special issue, which we overview next, advance knowledge and add compelling new nuances to our understanding of the circumstances and possible mechanisms involved in alterations of the cognition–emotion interface in alexithymia.

3. Overview of the special issue

Luminet et al. (2021): The special issue begins with a review of the empirical research in alexithymia that directly addresses the cognition–emotion interface across the domains of attention, appraisals, memory, language and behaviours (Luminet et al., 2021). The paper importantly and uniquely analysed the literature towards identifying and distinguishing specific patterns of *deficits* in alexithymia, in contrast with findings of excessive responding, which they dubbed “*over-responding*”, together with delineating the specificity of the effects as a function of the type of material, and the context involved (i.e. affective vs. non-affective). Although there was a primary pattern of deficits in processing across domains, over-responding was also frequently found, with a particularly striking predominance in the domain of behaviours. These patterns were further evaluated relative to specific alexithymia facets, wherever a facet-level analysis was available, providing a clearer and more nuanced picture of what to expect in emotion processing studies in alexithymia.

Importantly, the facet “externally oriented thinking” was consistently linked to deficits, while the facets “difficulty identifying feelings” and “difficulty describing feelings” were more typically linked to over-responding, sometimes even to beneficial over-responding. Furthermore, these patterns of deficits and over-responding were not limited to emotive contexts and materials but were found also for some neutral contexts and materials. Finally, the paper discusses how the preponderance of the findings fit with several contemporary emotion theories, indicating that impaired or biased attentional processing and cognitive control, during both early and late processing, along with impaired emotion schemas, contribute to downstream effects on appraisal, memory, language and behaviours. This framing was used to show how future alexithymia and emotion research can guide each other, and how clinical interventions in alexithymia might be informed by cognitive findings.

Panayiotou et al. (2021): The second paper of the special issue is a review of disruptions of physiological reactivity and emotion processing in alexithymia, which contextualised the findings in the attention domain. Panayiotou et al. (2021) draw on a selective literature review of valence, arousal, attention, memory, executive control and interoception to evaluate the inflexibility of emotion regulation as a catalyst for elevating allostatic

load (McEwen, 1998). Specifically, maladaptive emotion regulation is conceived to lead to frequent stress, inadequate reactivity, failed shutdown and failed habituation, which can ultimately result in physical and mental illness. They advocate for alexithymia investigations that extend beyond simple reactivity to emotional stimuli, proposing instead a dynamic-phasic model of emotion regulation focused on five stages of processing (anticipation, response, recovery, habituation and rest), toward evaluating emotion regulation flexibility and its role in alexithymia.

Notably, in considering physiological reactions, disruptions at the anticipation and response stages of emotional processing were proposed to correspond to alexithymia-related dysfunction in attentional deployment. In support of the proposal, electrophysiological evidence was presented indicating reduced early processing of emotional material in alexithymia, suggestive of dysfunctional attentional engagement and attentional control that underpin slow or inadequate recovery from emotional stressors. Although this important review did not consider alexithymia facets, the proposal offered is nevertheless fitting with the other review paper in this issue (Luminet et al., 2021), which consistently showed attention and appraisal deficits, with "externally oriented thinking" as the primary facet associated with these deficits.

Larwood et al. (2021): In their paper, Larwood et al. (2021) examined the influence of alexithymia on ratings of intensity and valence for a series of musical excerpts designed to represent anger, fear, joy, sadness and tenderness. This paper thus addresses appraisals processes, which is the act of subjectively evaluating stimuli or situations and is central to the generation of emotional feeling states in response to provocative stimuli (e.g. Ellsworth & Scherer, 2003; Frijda, 1986). Appraisals can take multiple forms, but in alexithymia, valence has been the focus of study to date (see Luminet et al., 2021). The results of Larwood et al. (2021) showed that participants with higher alexithymia rated pieces depicting negative emotions as more neutral than did participants with lower alexithymia. In contrast, no influence of alexithymia was found when pieces depicted positive emotions. These results fit with studies evaluating the recognition of non-verbal emotions (i.e. auditory vocalizations, such as laughs or cries), in which alexithymia was related to reduced accuracy for negative, but not positive stimuli (Bayot et al., 2014).

Moreover, Larwood and colleagues also found that participants with higher alexithymia rated more extreme emotions (i.e. anger and fear) as less intense than did low alexithymia scorers. Yet, they rated less extreme emotions (i.e. sadness) as *more* intense than did those with low alexithymia. These results highlight an overall blunting effect of alexithymia on the appraisal of negative stimuli, as well as an inability to distinguish among emotional states that vary in terms of intensity. This is consistent with the theory that alexithymia-related deficits in responding to emotion are due, at least in part, to poor evaluation of stimulus valence or intensity resulting from poor early processing for stimuli that have a high demand for processing resources (Luminet et al., 2021; Panayiotou et al., 2021). By investigating emotional responses to music, the study by Larwood and colleagues represents an important extension of the literature examining appraisal processes in alexithymia, which has tended to focus only on emotional responses to personally experienced events (e.g. Luminet et al., 2000) or to visually presented affective words or images (e.g. Aaron et al., 2018; Koven, 2014; Luminet et al., 2004).

Given the evidence of poorer emotional awareness and differentiation (da Silva et al., 2017) and less well-developed emotion schemas (e.g. Luminet et al., 2006; Lundh et al., 2002; Vermeulen et al., 2006), it is not altogether surprising that people with higher alexithymia scores would be less likely to benefit from the typical salience effects of emotion, where attention is captured and directed toward emotive content (e.g. Yiend, 2010). It is well-understood that memory is assisted by these salience effects (e.g. Mather & Sutherland, 2011; Nielson & Correro, 2017). As such, we might expect that memory deficits would be common in those with higher alexithymia, at least in emotive contexts. While literature examining memory in alexithymia has grown quickly in recent years, there is a lack of study of the intersection of these processes that would better characterise the

contexts and sources of memory deficits in alexithymia. The next three papers that examine memory processes answer these important gaps in current knowledge.

Correro et al. (2021): In their paper, Correro et al. (2021) examined episodic memory (i.e. immediate and delayed recall for stories and words) and executive functioning (i.e. cognitive control, complex attention) in three independent, large sample cross-sectional studies. They furthermore explicitly examined memory using neutral rather than emotive memoranda, hypothesising that with strong statistical power, subtler general relationships between alexithymia and memory might be apparent. Contrary to Larwood et al. (2021), who only examined total alexithymia scores, this paper, together with all the subsequent papers, also include an analysis at the facet level of alexithymia. The paper by Correro and colleagues provides compelling evidence about the cognition–emotion interface on three fronts. First, it importantly revealed that alexithymia contributes to *general* cognitive deficits, particularly those associated with aging. Second, it extended the existing literature to affirm that alexithymia contributes substantively to memory deficits, even for neutral material or contexts, including after delayed retention testing, which has not been well-studied so far. Finally, this study highlighted distinct contributions of the alexithymia factors "difficulty identifying feelings" and "externally oriented thinking" in memory functioning.

Correro et al. (2021) found that "difficulty identifying feelings" was linked to executive functioning deficits, suggesting reduced processing resources available for complex tasks in alexithymia. Executive functioning is fundamentally important to tracking relevant stimuli, ignoring irrelevant stimuli, inhibiting unwanted responses, and correcting errors. Thus, the role of "difficulty identifying feelings" in executive functioning reinforces that alexithymia alters early stimulus processing, including attention and appraisal, which can produce downstream effects on cognition, such as memory and behaviour, even in neutral contexts. This is consistent with the expectations posed by both Panayiotou et al. (2021) and Luminet et al. (2021). Indeed, Correro et al. (2021) found "externally oriented thinking" was responsible for memory deficits, due to reduced meaningfulness or salience of important memoranda (i.e. "signal") relative to foils (i.e."noise"), and that poor executive functioning exacerbated this effect in older adults. Thus, the authors concluded that "externally oriented thinking" reduces the ability to use internal cognitive control processes that can facilitate effective memory storage and access (Dressaire et al., 2015). This poor internal monitoring results in risks for generally poorer cognitive functioning in older age.

Vermeulen (2021): Previous literature on memory and alexithymia has focused on long-term memory (LTM) abilities (albeit almost exclusively with short retention delays), showing that retrieval is hampered in high alexithymia when the to-be-remembered stimuli or the events are emotional (e.g. Vermeulen et al., 2018). While LTM also plays a central role in short-term memory (STM) performance, very few studies have examined STM (i.e. working memory) in alexithymia (DiStefano & Koven, 2012; Takahashi et al., 2015). In his paper for this special issue, Vermeulen (2021) extends prior investigations of STM for affective and neutral words by contrasting the effects of blocked- (Study 1; only positive, negative, or neutral stimuli) and mixed-valence memoranda (Study 2; positive frequent or rare, negative frequent or rare) in alexithymia.

The results showed that alexithymia was related to a deficit for short-term memory of words, but only in the blocked condition where lists included only one category of words (Study 1). Deficits were associated with "externally oriented thinking" for all word categories; for positive words, deficits were also associated with "difficulty describing feelings". It was suggested that the poorly integrated emotion schemas in alexithymia contribute to reducing access to emotion categories, and reducing the "richness" of emotion material in particular. The results fit well with the hypothesis that those with higher alexithymia have difficulty linking symbolic and sub-symbolic representations of their past (Bucci, 1997; Taylor & Bagby, 2004), as well as with the recent attention-appraisal model that attributes alexithymia specifically to deficits of attention ("externally

oriented thinking") and appraisal ("difficulty identifying feelings, externally oriented thinking") in emotion processing (Preece et al., 2017).

Ridout et al. (2021). Nearly all memory studies in alexithymia have examined verbal memoranda. In contrast, Ridout et al. (2021) importantly extend the literature by examining the influence of alexithymia on memory for socially relevant non-verbal stimuli, including faces (Study 1) and social interactions (Study 2). In Study 1, their findings showed that "difficulty describing feelings" contributed to poorer recognition memory for emotional faces. Moreover, the deficits were particularly strong when faces exhibited anger. This memory deficit, related to "difficulty describing feelings", was also apparent in a prior study with face stimuli (Donges & Suslow, 2015) and is consistent with other studies that highlight a specific deficit in alexithymia for detecting and attending to anger and, more generally, threat-related information (e.g. Fujiwara, 2018; Luminet et al., 2011; Vermeulen et al., 2006, 2008).

In Study 2, Ridout and colleagues (2021) found that "difficulty identifying feelings" was related to poorer memory for emotional social interactions, particularly for interactions featuring anger and happiness. However, "difficulty identifying feelings" was also related to *better* familiarity for neutral interactions. Similar results were shown with words by Dressaire et al. (2015). However, this finding differs from Correro et al. (2021), where neutral memory deficits attributed to "externally oriented thinking" were worsened in those with high "difficulty identifying feelings". Importantly, Correro and colleagues used an exclusively neutral context. In contrast, participants in Ridout et al. evaluated emotive and neutral social interactions; the neutral interactions were likely easier to appraise, relative to the emotive interactions. Thus, "difficulty identifying feelings" might *facilitate* processing, if the context, even a neutral context, allows for less difficult appraisal (Luminet et al., 2021; Preece et al., 2017).

Taken together, these three memory papers suggested that alexithymia impairs memory in both short-term and long-term forms, although attention and appraisal likely contribute significantly to the findings and to the facet responsible for those effects. Moreover, the three alexithymia factors were involved in memory deficits through different underlying processes. "Difficulty identifying feelings" was related to executive functions deficits that can be linked with decreased processing resources and greater difficulty mobilising them (Correro et al., 2021). It was also related to deficits in memory for social interactions, notably those involving anger. "Difficulty describing feelings" was also related to deficits in memory involving anger, but in relation to face processing (Ridout et al., 2021).

The implications of these results are important because an anger display is a central component of threat, which activates the search for urgent responses in order to avoid danger. Specific deficits for anger processing suggest that alexithymia leads to reduced attention and reactivity when situations require particularly fast responses (see Vermeulen et al., 2006 for an extended discussion of the role of anger deficits in alexithymia). "Difficulty describing feelings" was also related to decreased STM that was linked to poorly integrated cognitive schemata (Vermeulen, 2021). Finally, in addition to decreased STM, "externally oriented thinking" was related to decreased internal monitoring and awareness that reduces the ability to extract and prioritise meaningful or salient information from extraneous and inaccurate information (Correro et al., 2021).

Verbal and non-verbal language allows people to communicate inner thoughts and feelings and to understand the utterances of others, which is central to social life. Studies have explored language expression in alexithymia, finding consistent deficits in alexithymia, typified by reduced complexity, openness and emotional content (see Luminet et al., 2021; Welding & Samur, 2018), which are linked to deficits of empathy (Grynberg et al., 2018) and mentalizing affect (Fonagy et al., 2002). Such findings suggest that language comprehension would also suffer from deficits in alexithymia. However, there is a paucity of studies specifically examining language comprehension abilities in alexithymia, except as it pertains to attention (e.g. Stroop, priming; see Welding &

Samur, 2018). Fortunately, two papers that contributed to this special issue have directly addressed language comprehension in alexithymia.

Samur et al. (2021): In their paper, Samur et al. (2021) conducted both a large-cohort online study and a smaller laboratory study to measure the influence of contextual support on language comprehension, as a function of narrative engagement in alexithymia. Participants read fictional narratives written from either first-person or a third-person perspective. First-person perspectives tend to better support and engage listeners, purportedly because they support "mental transportation", helping the person to better transcend the here and now and project themselves into distant times and places (Macrae et al., 2014), which contributes social-cognitive skills (Mar & Oatley, 2008). Their results showed poorer narrative engagement in alexithymia (both for the total score and for a poor fantasy life or fantasising facet[1]). Moreover, they found that only those scoring low on alexithymia were able to benefit from first-person narratives to enhance engagement; those scoring high on alexithymia via the fantasising facet had no difference in engagement based on the narrator perspective. These findings compellingly suggest a deficit of perspective-taking in alexithymia consistent with reduced narrative engagement, which is likely due to poorer mental imagery (van der Velde et al., 2013) and poor development of emotion schemas (Hoemann & Feldman Barrett, 2019) and empathy (Grynberg et al., 2018).

Jakobson and Pearson (2021): The paper by Jakobson and Pearson (2021) examined whether the mentalizing abilities required to understand the implicit intentions of a speaker are influenced by alexithymia. Participants watched video-taped vignettes of a speaker making sincere or insincere statements in response to a question posed by an interviewer. Participants were asked to judge whether the statements were meant to be taken literally or sarcastically (in jest) or as a "fib" (i.e. a trivial lie). These were either positive (e.g. compliments) or negative (e.g. criticisms). For each statement, viewers were given either no added context, where only non-verbal cues (e.g. facial expressions, voice, body language) could be used to discern the speaker's intentions, or they were given added verbal context cues. These verbal cues, which were provided in half the videos, were short vignette segments that preceded the exchange with the interviewer, where the speaker communicated their true intentions to a third person. Thus, when watching the vignette, the participant had insight into the speaker's true intention that did not have to be surmised from behavioural cues alone. The analyses controlled for verbal intelligence and sex. The results showed that alexithymia did not impair the accuracy of discerning the speaker's intent. Indeed, *better* accuracy was associated with "difficulty describing feelings", perhaps because thresholds for excitation and sensation are typically lower in alexithymia (Liss et al., 2008), which may have made these vignettes particularly engaging to those with alexithymia. The authors suggested that "difficulty describing feelings" would instead impair performance for emotionally charged vignettes. Importantly, "difficulty identifying feelings" resulted in slower decision-making about speaker intentions when relying on non-verbal cues, which could hamper everyday social functioning.

Taken together, the two language papers in this special issue uniquely and crucially show that socio-emotional interactions, including perspective-taking, emotional empathy, imagery, and language comprehension may be hampered by alexithymia. This is fitting with the suggestion that theory of mind, including making inferences about others' states of mind, is impaired in alexithymia (Grynberg et al., 2018). They furthermore highlight that analysis of the specific contributions of facets is important to revealing when and under what circumstances alexithymia might influence social interactions. Specifically, these two unique studies suggest different roles in language for each alexithymia facet.

"Difficulty identifying feelings" appears to hamper decision-making about others' communications (Jakobson & Pearson, 2021), which is consistent with reduced capacity for and mobilisation of executive function resources (e.g. Correro et al., 2021), which may be amplified in anger contexts (Ridout et al., 2021). "Difficulty describing feelings" may be helpful to understanding others' communications when the context is unemotional, though it may have the opposite effect under emotive conditions, perhaps particularly in anger or other threat contexts

(e.g. Ridout et al., 2021). Finally, fantasising (closely linked to "externally oriented thinking") contributes to deficits in perspective-taking, perhaps due to poor empathy (Grynberg et al., 2018), emotion schemas (Hoemann & Feldman Barrett, 2019) and internal monitoring and extraction of meaningful information from the environment (Correro et al., 2021). Notably, the findings of these studies also strongly suggest the importance of the further study of language comprehension in social situations in alexithymia and point to the need for a more nuanced evaluation of fantasising and emotional reactivity to better interpret these effects (Jakobson & Pearson, 2021).

Gvirts and Dery (2021): The final paper, by Gvirts and Dery (2021), provides new perspectives on the impact of alexithymia on social alignment. Social alignment theory suggests that people create connectedness, closeness and likability by creating alliances with other members of a group through thoughts, emotions and behaviours (Shamay-Tsoory et al., 2019). Because of poor communication skills, those with higher alexithymia scores would exhibit reduced social alignment. To evaluate this hypothesis, participants were randomly assigned to play an online game with a group of seven other players. Unbeknownst to participants, these "players" were either other humans, or they were bots programmed to behave more rationally than humans. The game used five cards with animal images, each with a different point value. These specific values for each card differed between players and players only knew their own valuations. The goal of the game, involving 10 rounds, was to shift choices to reach a group consensus of card choice, before time expired. During the rounds, players could see the number of players who had chosen each card. Thus, to reach consensus, they had to actively shift their choice until a consensus was reached. If no consensus was reached prior to the deadline, zero points were earned, making consensus reaching valuable. It also required making choices that could reduce the individual points earned by prioritising the card preferred by others. This "opposing alignment" is indicative of rational decision-making.

Gvirts and Dery (2021) found that higher "externally oriented thinking" scores predicted irrational decisions, but for different underlying motives depending on the type of opponent. When playing with bots, those with high "externally oriented thinking" exhibited heightened opposing alignment, where players inhibited personally beneficial actions toward better promoting a consensus. It was suggested that this likely occurred because the drive to avoid conflict was higher due to high harmony amongst other players. In contrast, during games against humans, where consensus-building was less consistent, those with higher "externally oriented thinking" exhibited less opposing alignment, instead of tending to prioritise personal gain. Social alignment has been associated with reward (Shamay-Tsoory et al., 2019). As such, Gvirts and Dery suggested that those with higher "externally oriented thinking" are less reliant on reward sensations because they did not strive to prioritise group harmony when playing against other imperfect consensus-builders. They did so only when consensus was very high; not doing so would create high conflict and disrupt group harmony. Indeed "externally oriented thinking" has been linked to poor perspective-taking (Grynberg et al., 2010), social detachment (Vanheule et al., 2011) and various aspects of impaired cognitive processing (see Luminet et al., 2021). This study compellingly contributes to our understanding of the social difficulties that have been reported experimentally, and observed clinically, in those with high levels of alexithymia, such as impaired processing of the emotional states of others, deficits in empathy and compromised pro-sociality (Grynberg et al., 2018).

4. Conclusions and new perspectives

An important finding across the papers of this special issue is the repeated observation of a lack of correspondence amongst emotional responses in alexithymia. This lack of correspondence is first apparent between processes, as well as amongst the alexithymia facets. In the review by Luminet et al. (2021) and across multiple empirical papers in this special issue there was a strong dominance of emotion-related cognitive deficits, particularly in memory and language, contrasting with an over-responding to emotion or threat in

behavioural responding. Impaired performance in the cognitive domain was associated with each of the alexithymia facets, but dominantly so with "externally oriented thinking". These effects have been linked to poor internal monitoring and avoidance behaviours (see Luminet et al., 2021; Preece et al., 2017). In contrast, "difficulty identifying feelings" was more often associated with an over-responding to emotion or threat (e.g. Teten et al., 2008; Velotti et al., 2016), and together with "difficulty describing feelings", was linked to the poor appraisal of stimuli, cognitive control and evaluation of salience (see Luminet et al., 2021; Preece et al., 2017). Thus, these studies collectively highlight that emotion processing is not homogeneous across processes. That is, it is not represented by a continuous dimension where "more is better". Instead, deviations in either direction from typical may reflect the influence of distinct underlying cognitive mechanisms. Alexithymia research exemplifies the opportunities available to better delineate and explain the foundations and mechanisms of these deviations.

The lack of correspondence between emotion processes found in the special issue corresponds to a small number of empirical studies that have simultaneously considered the three emotion components (physiological, behaviour-expressive and cognitive-experiential). These studies show that in low alexithymia the three components are positively associated, while in high alexithymia they are dissociated[2] (Constantinou et al., 2014; Pollatos & Gramann, 2011). Similarly, Peasley-Miklus et al. (2016) reported weaker physiological–cognitive/experiential and behavioural–cognitive/experiential associations in higher alexithymia participants. These responses contrast with a fuller, normal emotional experience that involves the activation of the three emotional components.

Studies that have examined combinations of the three components together (e.g. multi-component studies) show that in normative samples they are correlated, although not always strongly so (e.g. Bradley & Lang, 2000; Cacioppo et al., 1992; Mauss et al., 2005). A central outcome is that emotional awareness is generated through synchronisation amongst emotional components (Scherer, 2000, 2005; see also Grandjean et al., 2008), which fits with models suggesting that alexithymia is related to emotion awareness deficits (three-process model, Smith et al., 2018; see Luminet et al., 2021 for a discussion of the relevance of the model to account for cognitive–emotional impairments in alexithymia). Furthermore, dissociated emotional components have been demonstrated as a risk factor for long-term negative health outcomes (e.g. Myers, 2010; Schäflein et al., 2018), providing a process explanation for the ubiquitous negative mental and physical health outcomes in alexithymia (e.g. Morie & Ridout, 2018). Together, these findings illuminate the intersecting and situationally specific relationships amongst emotional components and emphasise the value of multi-component studies for a fuller understanding of the interface between cognition and emotion generally, and specifically in individual and personality differences.

The papers on the special issue also provide valuable insights for future research on the cognition–emotion interface. We briefly consider insights at three levels of analysis: extending the type of processes involved, considering systematically neutral and emotive contexts together, and improving methodological condition. At the process level, at least four papers in this special issue (Gvirts & Dery, 2021; Jakobson & Pearson, 2021; Ridout et al., 2021; Samur et al., 2021) illustrate the richness of systematical investigations into interpersonal and collective processes such as empathy, pro-social behaviours or norms adherence, clearly indicating these processes have important influences on cognitive-emotion interactions beyond the intra-individual level. Studies such as the one by Correro et al. (2021) furthermore highlight the importance of drawing better connections amongst multiple processes, toward disentangling the effects of early processes (e.g. attention) on later processes (e.g. memory and language). In addition, they suggest the value of better delineating relationships between cognitive processes, such as executive functions, and personality characteristics, including and beyond alexithymia.

At the context level, it is important to consider that the processing of neutral information is not simply a baseline measure to compare with emotional stimuli. While studies of the cognition–emotion interface tend to focus on processing during emotive contexts, the papers in this special issue show that neutral information is not immune to the influence of individual differences, resulting in both deficits (e.g. Correro et al., 2021; Vermeulen, 2021) and benefits (Ridout et al., 2021).

Finally, at the methodological level, the papers in this special issue demonstrate that the vast majority of studies of the cognition–emotion interface in alexithymia are done cross-sectionally and in normative samples. These papers highlight the need for a greater focus on longitudinal and experimental designs that allow for causal interpretations regarding influences on the cognition–emotion interface. Regarding normative samples, alexithymia is a stable personality trait, rather than simply a clinical categorisation (e.g. Luminet et al., 2001). Thus, it is important to consider that studies of the cognition–emotion interface in alexithymia, including all of the papers in this special issue, have almost exclusively employed normative rather than severe or clinical samples. Moreover, each paper demonstrated significant cognitive and behavioural implications of alexithymia without the aid of severe populations, and even extended beyond emotion processing into more general cognitive processing. It would therefore be expected for such effects to be more exaggerated, and even more important to address, in more severe alexithymia. This conclusion further implies that all studies of the cognitive-emotion interface would directly benefit from a greater consideration of the contributions of personality differences, alongside well-designed experimental methods, thereby allowing more thorough explanatory frameworks.

In conclusion, thea studies that compose this special issue highlight that alexithymia influences several aspects of how one perceives and responds to neutral and emotional situations and interacts with others in those situations. From the introductive vignette presented by Luminet et al. (2021), we can highlight that scoring high on alexithymia has multiple implications for daily life. A lack of variation in emotional responses, a scarcity of experiencing pleasant feelings, and an attribution of personal reactions to external rather than internal circumstances limits the extent and quality of their social network, increases the likelihood of somatic illnesses, and restricts their inner world to purely factual concerns. These outcomes are broad and consequential for their biological, psychological and social life. We expect that the findings presented in this special issue can help to advance the design and targeting of both future cognition–emotion research, and the development of effective interventions to improve emotion processing and reduce risk and manifestation of physical and emotional illness.

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Notes

1 Poor fantasy life is assessed in some self-report scales such as the BVAQ (Bermond et al., 2015). It is closely related to externally oriented thinking.

2 Dissociation across emotional components can take different forms. Specifically, there can be simultaneous activation of one component while there is deactivation of another, or deactivation or activation of one component, with no activation of other components.

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