Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Humanities
Department of Language and Literature

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Unravelling the Role of Emotion and Affect in Language Comprehension

A Necessity Test

Master's thesis in English Linguistics and Language Acquisition
ENG3920
Supervisor: Giosuè Baggio
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Abstract

The traditional view of language comprehension as a cognitive process has been challenged by a variety of emotive linguistic expressions, and a considerable number of experimental studies have demonstrated the involvement of emotional mechanisms. This paper explores the necessity of emotion and affect in language comprehension and identifies cognitive and affective systems that are thought to be involved in this process. Over the past few decades, the field of emotion research has gradually permeated into the discipline of linguistics. This has led to the development of a particular affective theory of language – the Affective Language Comprehension model (the ALC model by van Berkum, 2018, 2019) – which can facilitate psycholinguistic and neurolinguistic research, and the advancement of other scientific disciplines. The main rationale for this development is the recognition that understanding and processing language is not an objective process empty of emotions, but rather a deeply emotional phenomenon. The focus of this paper is twofold. Firstly, it reviews the ALC model. Secondly, it discusses a recent Norwegian ruling on what constitutes punishable verbal abuse against public officials under the Norwegian Penal Code (HR-2023-2392-A). In order to test whether emotion and affect are always necessary for comprehension, the condition of alexithymia (emotion deficit) and understanding in AI systems such as Large Language Models (LLMs) are investigated. The findings suggest that emotional empathy, moral evaluation, affective simulation, and thus emotional competence, are prerequisites for more profound language comprehension. These abilities are impaired in individuals with alexithymia and lacking in LLMs. The results of linguistic experimental studies are noteworthy, demonstrating a pivotal role of emotion and affect in interpreting the speaker's intentions and attitudes. In this sense, emotion and affect are considered to be necessary for the understanding of language. The brain's early response to offensive language can be as rapid as 200-250 milliseconds, emphasising the significance of emotional and affective factors in language comprehension, which enables the identification of potential harm to the survival and well-being of the human organism.

Sammendrag

Det tradisjonelle synet på språkforståelse som en kognitiv prosess har blitt utfordret av en rekke emosjonelle språklige uttrykk, og et betydelig antall eksperimentelle studier har vist at emosjonelle mekanismer er involvert. Denne masteroppgaven utforsker nødvendigheten av emosjoner og affekt i språkforståelse og identifiserer kognitive og affektive systemer som antas å være involvert i denne prosessen. I løpet av de siste tiårene har feltet for emosjonsforskning gradvis trengt inn i faget lingvistikk. Dette har ført til utviklingen av en spesiell affektiv språkteori – the Affective Language Comprehension model (ALC-modellen av van Berkum, 2018, 2019) – som kan assistere psykolingvistisk og nevrolingvistisk forskning, og andre vitenskapelige disipliner. Hovedbegrunnelsen for denne utviklingen er erkjennelsen av at forståelse og bearbeiding av språk ikke er en objektiv prosess uten emosjoner, men snarere et dypt emosjonelt fenomen. Fokuset i denne oppgaven er todelt. For det første gjennomgås ALC-modellen. For det andre diskuterer den en nylig norsk rettsavgjørelse om hva som utgjør straffbare verbale overgrep mot offentlige tjenestepersoner i henhold til den norske straffeloven (HR-2023-2392-A). For å teste om emosjoner og affekt alltid er nødvendige for forståelsen, undersøkes tilstanden aleksitymi (emosjonell blindhet) og forståelse i KI-systemer som store språkmodeller. Funnene tyder på at emosjonell empati, moralsk evaluering, affektiv simulering, og dermed emosjonell kompetanse, er forutsetninger for dypere språkforståelse. Disse evnene er svekket hos individer med aleksitymi og mangler i store språkmodeller. Resultatene fra språklige eksperimentelle studier er bemerkelsesverdige, og viser en sentral rolle for emosjoner og affekt for å forstå talerens intensjoner og holdninger. Emosjoner og affekt anses i så måte som nødvendige for å forstå språk. Hjernens tidlige respons på støtende språk kan være så rask som 200-250 millisekunder, og understreker dermed betydningen av emosjonelle og affektive faktorer i språkforståelsen som muliggjør identifisering av potensiell skade for den menneskelige organismens overlevelse og velvære.

Acknowledgements

The connection between language and emotion is a fascinating subject. In 2019, I discovered the Affective Language Comprehension model proposed by J. J. A. van Berkum, which inspired me to explore the world of English linguistics. Upon arriving at NTNU, I was aware that studying the interface between language and emotion was not guaranteed due to the lack of courses devoted to this specific topic. Fortunately, I was given the opportunity to do so.

I am grateful to my supervisor, Professor Giosuè Baggio, for making my journey possible. He permitted me to engage with a diverse range of disciplines, including linguistics, neuroscience, affective science, neuropsychology, the field of AI and juridical affairs. Consequently, my understanding of the mind-body connection has deepened, and my critical thinking abilities have improved.

The process of writing this thesis was challenging, but it was also extremely rewarding to cross disciplines and to gain new insights into subjects with which I was less familiar. At times it was difficult to stay focused on the path I had chosen. Fortunately, my supervisor provided me with valuable advice and insights, which helped me stay on track. I would like to express my sincere appreciation for this guidance.

I acknowledge the Language Acquisition and Language Processing Lab (LALP) for invitations to journal clubs and guest seminars, as well as for providing me with the opportunity to participate in linguistic research. I am thankful to the Faculty of Language and Literature (ISL) for facilitating the study of sociolinguistics and social sciences during the preparation and writing of my thesis, which has broadened my interdisciplinary knowledge beyond my expectations.

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‘Tis a strange mystery, the power of words!
Life is in them, and death. A word can send
The crimson colour hurrying to the cheek,
Hurrying with many meanings; or can turn
The current cold and deadly to the heart.
Anger and fear are in them; grief and joy
Are on their sound; yet slight, impalpable:--
A word is but a breath of fresh air.

Letitia Elisabeth Landon
The Challenge

1 Introduction

1.1 Research Question and Overview

This paper explores the complex interplay between language and emotion and takes on the challenge of testing whether emotion and affect are necessary for language comprehension. In search of answers, I examine the Affective Language Comprehension model (van Berkum, 2018, 2019) and its extended version, the *facial* Affective Language Comprehension model (van Berkum et al., 2023). Relevant studies from the fields of affective science[1], psychology, cognitive neuroscience, psycholinguistics and neurolinguistics provide supporting evidence. The research question is thus:

- Are emotion and affect necessary for understanding language, and if so, how do they permeate comprehension?

In this context, I explore the condition of emotion deficit known as alexithymia (inability to feel, visualise and express emotions) and relevant perspectives from AI researchers with a focus on artificial language comprehension. The aim is to challenge the research question of whether emotion and affect are an integral part of understanding language. At a deeper level, this investigation has the potential to improve our understanding of affective communication between people. It highlights the profound importance of the speaker's intentions and attitudes, cooperation, and the needs of the individual.

The discussion includes a ruling by the Supreme Court of Norway (HR-2023-2392-A) on what constitutes punishable vulgarity. An indirect verbal insult directed at female public officials alluded to a North Norwegian emotion concept, and as we shall see, is therefore worthy of investigation. In particular, the question of how quickly the brain can respond to offensive language and why this is of interest is addressed.

The thesis is organised into 8 main Sections:

In Section 2, I provide an overview of the main theories of emotion relevant to language comprehension. The first part focuses on the theoretical frameworks that shed light on innate and socially constructed emotions. The second highlights cognitive factors relevant to affective language comprehension, such as the significant relationships between emotion and memory, and empathy and morality. In Section 3, I briefly introduce alternative linguistic

[1] I distinguish between emotion and affective science. In my view, affective science is a broader term that encompasses emotion science. It is a field that crosses disciplinary boundaries.

expressions of emotion to illustrate how emotional language has been studied, as supporting evidence for affective language comprehension. Relevant research methods for studying the language-emotion interface are presented in Section 4, while in Sections 5-6, I review the ALC model (van Berkum, 2018, 2019) and its extended version, the *facial* ALC model (van Berkum, et al., 2023). In Sections 7-8, I explore the impact of emotion deficit and how the concept of understanding language is used for Large Language Models (LLMs). Section 9 concludes with a theoretical discussion, including punishable verbal abuse and sexual harassment under the Norwegian Penal Code in the context of affective language comprehension.

1.2 Limitations

There are certain limitations to this thesis. Scientifically, there is no consensus on the precise nature and classification of emotions. Consequently, I refrain from examining the complex roles and manifestations of specific emotions. The complexity of emotions, believed to be intricately linked to personal experience and the mysterious workings of the subconscious mind, should justify this decision.

In terms of grammatical factors, the ALC model (van Berkum, 2018, 2019) specifically emphasises the multimodality of Jackendoff's Parallel Architecture, Construction Grammar and Lakoff's approach to conceptualisation. As a result, other grammatical approaches will not be discussed within the scope of this thesis.

The ALC model (van Berkum, 2018, 2019) includes the study of word valence but does not explore how individual constituents of a word may convey specific emotions. The study of micro-level linguistic-emotional phenomena is not considered relevant to this discussion as there is still a considerable amount of scientific work to be done to understand the relationship between language and emotion.

Finally, I do not include an exploration of the various pathways to alexithymia and therefore do not consider individual differences and the complex psychology underlying personality traits and psychiatric disorders. This decision was made due to the extensive depth of these topics.

1.3 The Significance of Emotion-Based Approaches

Emotion and affect have not been given the attention they deserve in many areas of education, and even in our modern society emotions are often perceived as irrational. This view has its

roots, for example, in the French philosopher René Descartes' idea that "I think, therefore I am", and much further back in human history. But emotions, in short, are seen by emotion scientists as having vital purposes for one's well-being; to efficiently welcome what is predicted to be good and to keep away what is predicted to be bad. During the 20th century, affective science has increasingly developed and can point to remarkable research, not only theoretical presentations but also highly advanced experimental studies linking emotion and affect to human behaviour and cognitive functions. Interestingly, affective science has also found its way into linguistics and several eminent scholars observe that "affectivism" is increasing (see Dukes et al., 2021).

2 Key Emotion Theories Significant for Language Comprehension

In this Section, I briefly outline the leading theories of emotion that are considered relevant to language comprehension (see van Berkum, 2022, for more details). The first part focuses on scientific views of emotion, while the second part highlights issues in cognition that correspond to language and emotion, as elucidated by van Berkum's research (2018, 2019).

2.1 The Nativist View

The nativist (biological) view is based on the work of Darwin (1872) and essentially studies the relationship between communication, emotions and facial expressions across cultures. Paul Ekman, one of the best-known researchers in this field, argues that universal basic emotions[2] share two important characteristics: Evolutionary adjustment and discreetness. As evolution progressed, it is believed that biological emotions made us equipped to handle and regulate basic life activities. Discrete emotions are seen as separate because they are facial, voiced and physical, and are thought to be responses to triggering events due to societal development. In this context, Ekman and Cordaro offer a non-exhaustive list of 7 universal basic emotions; anger, fear, surprise, sadness, disgust, contempt and happiness (Ekman & Cordaro, 2011, pp. 364-365).

The difference between these 7 emotions and other psychological states is that almost every emotion seems to share at least thirteen universal features, for example: 1) Clear activity of the facial muscles (e.g. face of anger) and physiological shifts (e.g. heart rate variation) are closely related to different emotions; 2) Emotional triggers are automatically

[2] It is widely known that emotion scientists do not agree on the definitions of emotion and affect. Therefore, emotional and affective concepts are used differently but also interchangeably. However, many emotion scientists do agree that emotions must have evolved to make us capable of dealing with life's ever-changing circumstances, and the onset of emotion is thus automatic and extremely swift (van Berkum, 2022).

evaluated; 3) Certain triggers are strongly linked to different emotions, e.g., anger with risky behaviours; 4) Animals have emotions; 5) Emotions have a rapid impact, i.e., they can come instantly; 6) Emotions can be temporary *and* become undesirable; 7) We relate emotions to certain ways of thinking, remembering and imagining, e.g., anger and thoughts of revenge; 8) Being aware of feelings is how an individual perceives emotions; 9) When we are in a state of fear, our focus is on the danger. This means that the emotion is accompanied by an uncontrolled period, which is a period of sifting through details of the outer surroundings or memory; 10) Everything is a source of emotion; and 11) Emotions can be managed in a functional or dysfunctional way (Ekman & Cordaro, 2011, pp. 364-365; van Berkum, 2022, pp. 7-8). Although Ekman does not believe language alone can trigger emotions[3], he finds it surprising that expression in writing can be a source of emotion. In addition, Ekman and Cordaro argue that language and emotion can evolve separately and therefore do not depend on each other. Thus, biological emotions are not created by society, but language is (Ekman, 2004, p. 35; Ekman & Cordaro, 2011, p. 369).

2.2 The Motivational View

The motivational view is based on research by Frijda who argues that emotions trigger action. In other words, emotions can be seen as desires that are triggered by circumstances or intentions that create forms of action (Frijda, 2007[4], Fig. 1.1). As such, we can control our emotions to some extent even though they emerge automatically. We are therefore not solely imprisoned by emotions because we can learn how to better manage them even if they can be demanding (e.g. addictive). Within this perspective, the notion of action is crucial to the understanding of emotions. An overview of the essential factors of action is proposed: Leaving or staying, obeying, giving orders, resting, encouraging, indifference, or destruction. The purpose of these factors is to *prepare* the organism to create, preserve or regulate a particular connection or relationship. Established action patterns of behaviour (i.e., tendencies to act) are thus carried out because of the organism's interest, such as a longing for adventure and knowledge, separation, getting or keeping away, intimate relationships, and manipulation, to name but a few (Frijda, 2007[5], Fig. 2.2; Frijda, 2008, p. 72, van Berkum, 2022, pp. 9-10).

Against this background, Scarantino argues that three main features are essential to explain emotions: “Having an emotion customarily involves *appraising* a stimulus a particular

[3] Ekman believes we transform language into images and feelings (Ekman, 2004, p. 35).
[4] Fig. 1.1 The emotion process. Fig. 2.1 Action readiness factors. Fig. 2.2 Action readiness modes (Frijda, 2007).
[5] Currently available digital book of *The Laws of Emotions* by Frijda (2007) has a limited number of pages without page numbers.

way, *feeling* a particular way, and being *motivated* to act a particular way" (Scarantino, 2014, p. 156). In the field of philosophy of emotion, Scarantino argues that the motivational aspects that drive emotions have never been properly investigated. Therefore, a framework is offered to explain the characteristics of "emotional motivation"; the Motivational Theory of Emotion (Scarantino, 2014, p. 156[6]). Based on Frijda's notion of "control precedence", that is, characteristics of emotions that are inherently involuntary (Frijda, 2008, p. 72), Scarantino states that emotions are the organism's natural systems for controlling actions because they aim to classify and track the most important associative purpose. Our emotional behaviour is flexible in that one emotion can evoke different patterns of action (Scarantino, 2014, pp. 156–159, 2016, pp. 23-26, 2017, pp. 330-332). For example, silence in the face of verbal abuse may be an automatic or well-calculated action. However, in contrast to the nativist view, Frijda and Scarantino stress that *evaluation* is an important ingredient in the emergence of emotions.

2.3 The Component Process View

The Component Process Model of emotion (CPM) is a theory by Scherer (1984[7]; 2009) that also emphasises the importance of *evaluation*. Like the nativist and motivational perspectives, the CPM is rooted in evolutionary principles. Scherer's approach to the concept of emotion is a multimodal one and proposes a building block operation consisting of 5 essential emotion components and their functions: 1) Evaluation relates to the component of cognition; 2) Regulation of physical symptoms relates to the component of physiology; 3) Tendencies to act relate to the component of motivation; 4) The expression of observable intentions relates to the component of motor demonstration; and 5) The observation of the interaction between the emotional state and the external world refers to the component of personal feelings. As such, using the terms *emotion* and *feeling* interchangeably can lead to confusion. In Scherer's view, an emotion is a coordinated response of the organism's condensed systems to the appraisal of meaningful stimuli, whether external or internal. A feeling is recognised as an integral component of an emotion. Although different from an emotion, a feeling plays an important role in observing and managing inner states and the interaction between the organism and its environment (Scherer, 2005, pp. 697-699).

[6] In the currently available digital book chapter *The Motivational Theory of Emotions* by Scarantino (2014), most pages are inaccessible. See van Berkum (2022, pp. 10-11) for an overview of the theory of Scarantino's definition of emotion.
[7] The original article from 1984 was not found available in its entirety.

Furthermore, Scherer argues that emotion is not the same as other affective states and proposes five emotion categories: 1) Favourites (or preferences) refer to the determination of the positive or negative value of stimuli. They are stable and create a natural evaluation that allows the organism to check whether a stimulus can be considered pleasurable regardless of goals and needs; 2) Stance refers to relevant and persistent opinions about certain things or individuals; 3) States of mind (or moods) refer to extensive patterns of affect with ongoing personal feelings that influence behaviour and experience. They often occur for no particular reason (i.e., they cannot be localised), can last for hours or days and have subtle intensity, e.g., coming down as dark or joyful; 4) Emotional make-up refers to personality traits and their intense affective behaviour, such as being jealous, unfriendly, bad-tempered, or worried; and 5) Relational stance refers to exaggerating and thus influencing a social interaction through an automatic or calculated use of affected appearance when interacting with others, e.g., being civilised, encouraging, insulting, or detached (Scherer, 2005, pp. 703-706).

2.4 The Psychological Constructionist View

The psychological constructionist view differs in that emotions are *not* rooted in principles of evolution. Instead, emotion researchers who follow this perspective argue that emotions are mentally constructed because we tend to conceptualise to understand what we *experience*. In other words, a concept of emotion is generated by the human brain which is constructed by the particular society and culture in which one lives (Barrett, 2017a, p. 30; van Berkum, 2022, p. 13). In this view, an emotion is far more diverse than initially thought and Russell suggests we take a different approach asking questions such as (examples from Russell): What exactly is an emotion? How many emotions exist? What is their nature? How do they arise and differ from one another? What are their manifestations and functions? Language and our ability to conceptualise play a crucial role in answering these questions. We often believe what we see rather than questioning whether our visual perception is imagination. Not to forget, common cultural concepts of emotion can be unclear and ambiguous, and the distinction between what is considered emotional and what is not is debatable (Russell, 2017, pp. 1259-1262).

In this regard, two essential elements are proposed: “core affect” and “psychological construction” (Russell, 2017, p. 1264). In short, core affect is the simultaneous measurement of (dis)pleasure and (de)activation that produces a conscious and personal feeling. Feeling sad, for example, is a combination of displeasure and deactivation. Core affect is not about viewing something as destructive or beneficial, or as ethical or unethical valuable. Most importantly, core affect is not synonymous with emotion because it can occur without

awareness of situations as a result of the human organism's ability to change, e.g., due to drugs, hormones or the existence of something that science cannot identify. While many emotion researchers tend to explain in detail how an emotional event unfolds, Russell assumes that it is not possible to identify and explain every aspect of emotion; the assumption he coins psychological construction. The biological and social accounts of emotions are not disregarded, but our conceptualisation of emotions remains incomplete. The psychological construction approach proposes that there is no common emotional machinery. The emotion and other psychological operations merge as the emotion unfolds, and the unfolding emotion is thus not individually fixed or predestined (Russell, 2017, pp. 1264-1267).

2.5 Cognitive Approaches

2.5.1 Emotion and Memory

In answer to a speaker's performative utterances, a hearer's computational operations bring into play traces from long-term memory. These operations include visualising pieces of retrieved memories, where the visualisation is constructed from these memories and/or derived from the current situation, and during this process, emotional triggers may come to pass at various stages (van Berkum, 2019, p. 749).

Neuroscientific analysis of brain lesions shows that human memory is based on at least two collaborating yet independent neural systems: The amygdala (emotion processing) and the hippocampus (event memory). In other words, the brain's emotion and memory systems activate each other. This unique collaboration shows that emotions play a crucial role when memories are created; memories that are *not* emotionally influenced are less mentally clear and more likely to be forgotten. The amygdala and the sensory cortex regions complement each other in that they are linked to emotional triggers. In particular, emotional experiences are prioritised because the amygdala influences episodic memories (determined by the hippocampus) by affecting focus and comprehension (Phelps, 2004, pp. 198-200). In this sense, one could say that emotions are an ongoing cycle of functional or malfunctioning responses to something that has already taken place.

Adolphs et al. conclude that when stimuli are very energising and displeasing, the essence of the stimuli is best imprinted in memory. As such, the amygdala is an essential part of memory enhancement. But research suggests that the recollection of *specifics* of very energising and displeasing stimuli is less recalled in exactly the same situation. Their present study follows previous research on emotion and memory showing that the amygdala can

regulate long-term memory. *How* the amygdala can regulate memory is a tough question to answer, but over long periods, emotionally reconstructed memories appear to be adjusted by the amygdala. For example, research has shown that inappropriate words, such as foul language, are remembered better over time, and negatively charged stimuli correspond to biologically adaptive advantages; the human organism can assess whether it is facing something that can cause harm or injury (Adolphs et al., 2001, pp. 988-990).

2.5.2 Evaluation and Simulation

- Evaluation

Man's inherent ability to evaluate affects his perception of every aspect of his life (van Berkum, 2019, p. 744).

With this in mind, researchers have considered several basic principles when considering whether emotional appraisal is related to perception or cognition. For example, some researchers are of the opinion that there is a separation between the body and the mind. According to this view, the mind generates a perception-based model that drives action coordination from sensory input. That is, perception is a reflection of the environment on which emotional evaluation is based. In a similar vein, other scientists argue that before emotions can arise, the brain must perform an action that involves only the mind (e.g. mathematical calculations). However, both perception and cognition can evoke emotions but it is unclear what is involved. Another question is whether emotional evaluation is situational. If emotions are reactions that depend on particular circumstances, then it is the situation itself that evokes them. From this perspective, emotions are seen as an environmental adaptation mechanism. In any case, perception may have a stronger influence on emotional evaluation than cognition, although the role of cognition in emotional evaluation remains unclear. Either way, evaluation is often influenced by situational factors (Clore & Ortony, 2008, pp. 631-632).

Furthermore, Gantman and Van Bavel hypothesise that perception is influenced by an individual’s ethical principles and values. Since perception affects misperception and responsibility for misconduct, the codes of ethics and morality are important in perception. In particular, any content of a moral nature attracts attention and therefore interest. For this reason, the brain’s visual cortex more easily and frequently identifies emotionally connotated words (e.g. “kill”) which is known as the “moral pop-out effect”. Interestingly, the effect only occurs for ambiguous words that are detected at the edge of conscious perception. The visual

cortex is thus highly sensitive to morally offensive content (Gantman & Van Bavel, 2015, p. 631).

- Simulation

A hearer forms a mental image of the context to comprehend the topic being discussed by the speaker (van Berkum, 2019, p. 751).

Given this, situation models play an important role in language comprehension. There are several theoretical approaches to mental referencing, but the main idea is that language comprehension involves the construction of mental representations of situations indicated by a text. Abstract and specific ideas are part of everyday speech, and there is evidence that sensorimotor representations are activated during language comprehension in word and sentence processing, and in conversations. Said otherwise, during sentence comprehension, the linguistic context influences the activation of motor and sensory information. Findings suggest that when active verbs are read in a non-literal context, they produce less activation in the motor cortex than when they are read literally. In this context, enabling an assistive context ensures that both abstract and concrete words can be understood equally. To fully understand conversations, sensorimotor representations seem to work together with figurative representations and their references (Zwaan, 2016, pp. 1028-1032).

2.5.3 Empathy and Sympathy

Having an emotional attitude toward a particular viewpoint or subject elicits an emotional response from the person being addressed (van Berkum, 2019, p. 751).

Empathy and sympathy are concerned with ethical principles and moral values and are therefore thought to be directly related to affective stance-taking, emotional evaluation and moral simulation relevant to language comprehension. Definitions of empathy and sympathy may use different criteria, but relevant here is that sympathy can be seen as showing concern for others when there is a potential threat to their welfare (Darwall, 1998, p. 273). Empathy, on the other hand, is commonly grouped into two highly complex systems; cognitive and emotional empathy. Research suggests that cognitive empathy is the ability to *perceive* the affective states of someone else. Thus, the cognitive empathic system involves cognitive abilities such as taking another's perspective. On the other hand, emotional empathy is the ability to genuinely *feel* the emotive states that someone else is experiencing. In this way, the

emotional empathic system involves emotion recognition and contagion (Shamay-Tsoory et al., 2009, pp. 617-618).

The association between morality and empathy is complicated. In general, moral principles are concerned with criteria for respecting others and thus with fairness. However, as empathy facilitates moral observations and ethical decisions, it also impedes the sense of right and wrong by initiating prejudice. Research suggests that moral conduct is considerably influenced by cognitive (affective perspective taking), emotional (emotion contagion) and motivational (empathic concern) aspects of empathy (Decety & Cowell, 2014, p. 337). As these aspects play out naturally in conversations, empathy and language are connected in various ways. And when empathy is expressed in discourse, empathic grammatical and rhythmic patterns can be documented (Herlin & Visapää, 2016, p. 142). Ultimately, understanding can be achieved through both empathy and sympathy.

2.5.4 Grounded Cognition and Embodiment

There are several approaches to grounded cognition, and trends in cognitive science have moved toward the idea that personal experience profoundly affects lexical meaning (van Berkum, 2019, p. 749).

Some grounded cognition theorists focus on the nature of simulation. That is, the mental re-creation of experience through perception, bodily sensations and movements, and introspection. Other theorists consider social interactions relevant, such as interactions with the environment and the body through perception and action. Grounded cognition thus implies that cognition is strongly linked to simulation, action and physiological conditions. In language comprehension, typical individuals simulate affective states when reading texts with emotional content. In text comprehension, our spatial sense allows for simulation to visualise anything written. From this perspective, language as a cognitive process depends on the body, perception and the world around us. In this respect, grounding is therefore essential for language comprehension (Barsalou, 2008, pp. 618-633).

In a simplified example, figurative language relates to physical movement, bodily states and our sense of space. As we navigate and orient ourselves, we use prepositions such as “up” and “down” (Lakoff & Johnson, 1980, p. 14). From this point of view, language is embodied. Research also shows that language comprehension is grounded in spatial awareness. In a figurative time experiment, people were tested on their understanding of the following sentence: “The meeting originally scheduled for next Wednesday has been moved

forward two days" (Boroditsky, 2000, p. 7). The results show that people who are sitting down when they receive such a message, interpret it to mean that the meeting has been moved to Friday. If they are moving, they interpret that the meeting is on Monday (Boroditsky, 2000, pp. 7-8). Theories of grounded cognition, however, have been challenged by questioning whether words as symbols can acquire meaning in the absence of reference and experience (Harnad, 1990, p. 339; 't Hart, 2017, p. 3).

By considering emotion concepts as part of grounded cognition, we can raise awareness of how we process these concepts using our motor and somatosensory systems. The idea is that the processing of emotional concepts involves action-oriented responses. In this sense, action-oriented simulation is a response driven by mental needs and is highly contextual. As such, the context should initiate observable behaviour. Emotion concepts matter because we use them to make sense of how people behave and anticipate their actions. They encompass related abstract properties together with tangible sensorimotor characteristics associated with inner and outer physiological states, such as heart rate variation. And language allows us to have useful and dependable concepts to structure our thoughts (Davis et al., 2021, pp. 25-27; Winkielman et al., 2018, p. 2). As later pages will show, linguistic experimental studies confirm this and the grounding approach to emotion concepts is relevant to the Norwegian ruling.

2.6 Summary

The ways in which emotion theories approach emotions and affective states differ, and they may fall short of addressing the intertwining of emotion and language processing. In contrast, the complexity of the language-emotion interaction is perhaps more directly revealed by the cognitive approaches presented here. In any case, these theories form the basis for understanding the underlying factors of affective communication.

3 A Brief Overview of Linguistic Emotion Expression

This Section presents a variety of linguistic emotion expressions as part of the quest to understand the role of emotion and affect in language comprehension. The linguistic approaches presented here draw on semantics, sociolinguistics, cognitive linguistics and grounded cognition, showing how emotion and affect are embedded in linguistic expression. The point of departure is a brief consideration of speech acts that show the colour of emotion in them.

3.1 Speech Act Theory and Linguistic Indirectness – Emotional Reflection

Language conveys meaning only in context. As speakers communicate their intended meaning by acting toward their interlocutors, Austin proposed Speech Act Theory to explain what people do when they speak. He identified speech with three special features:

- The locutionary act is the act of language use as such.
- The illocutionary act is saying something and the intention behind the utterance.
- The perlocutionary act is the result of what has been said by persuasion, fright or force.

Searle, in turn, proposed a set of illocutionary acts which has limitations as it does not encompass all possible illocutionary acts. However, Searle's design can serve as a general outline for thinking about emergent emotions based on the aim of the act (examples from Clark and Saeed):

Table 1. Illocutionary Acts with Emotional Complexions

Illocutionary Act	Aim of the Act	Examples
Assertives	Get the addressee to form or attend to a belief.	Assert or conclude, e.g., diagnosis, predictions, denials and confessions.
Directives	Get the addressee to do something.	Requesting and suggesting.
Commissives	Commit the speaker to do something.	Promise, threat and offer.
Expressives	Express psychological states toward the addressee.	Thank, apologise, congratulate and welcome.
Declarations	Change an institutional state of affairs.	Firings, promotions and sentencings.
Verdictives	Determine what is the case in an institution.	Assessments and rankings.

Illocutionary acts can be recognised through sentence types such as declaratives (assertions), interrogatives (questions), imperatives (commands and requests) and exclamations (forceful expressions). However, each type has more variations. For example, imperative illocutionary

acts can be divided not only into commands and requests, but also into subcategories such as giving one's word, threats, good wishes, recommendations, insults, and a variety of sudden short emotional utterances (e.g. "You did it!") (Clark, 1996, pp. 133-137; Saeed, 2016, p. 237). Because language is our way of communicating about things that matter (as noted by van Berkum, 2019, pp. 760-761), the examples above are good illustrations of how emotions can infiltrate language comprehension. To demonstrate with a verdictive, when a research paper is rejected by a journal editor (following the example of Clark, 1996, p. 135), the author's understanding of the rejection is arguably based on cognitive and affective systems, as discussed in Section 2. From an evolutionary perspective, rejection is a powerful emotional trigger because it is perceived as threatening social acceptance. Researchers have used fMRI to identify that physiological pain is akin to brain patterns associated with rejection in the anterior cingulate cortex. In other words, individuals experience emotional distress when they perceive that they are not being valued (Eisenberger et al., 2003, pp. 290-292; Leary, 2022, p. 435). Besides, Foolen argues that emotions are communicative at all linguistic levels, such as expressives. However, due to the analytical approach of mainstream linguistics, the expressive lexicon has received less attention than emotion words and concepts (Foolen, 2012, pp. 353-356). As the Norwegian ruling will be a testament to, directives can be a highly emotive issue.

As is commonly understood, language is both direct and indirect. Indirect speech can convey additional meaning beyond what is explicitly stated and can bring about a variety of interpretations and emotions. Philosophers and linguists have wondered how we recognise and infer indirect speech acts leading to several cognitive approaches, such as Grice's conversational implicatures and Relevance Theory by Sperber and Wilson. Searle argues that indirect speech is comprehensible because our inference is underpinned by our understanding of three factors: The grammatically correct and purposeful nature of direct utterances, as well as the context and cooperation principles (Saeed, 2016, p. 241). As will be shown in the following pages, indirect language can be a matter of cognitive-emotional activities, as documented by Bašnáková and colleagues (2015). In line with this, Brown and Levinson refer to linguistic indirectness as "off record" expressions, meaning that they offer several reasonable interpretations. If a speaker wants to make a statement that is a threat to someone's face, he or she can do so off the record by leaving the choice of interpretation to the addressee (Brown & Levinson, 1987, p. 211). A recent development in the field of cognitive linguistics is Schwarz-Friesel's approach to emotive implicatures. In this view, when an utterance is

expressed to provide a subjective evaluation of its reference or circumstance, e.g., "It is freezing", the emotive implicature of discomfort has to be drawn before inferring the implicature that a change to the uncomfortable condition is requested (Schwarz-Friesel, 2015, pp. 168-169).

3.2 Polite Expression

Brown and Levinson examine linguistic politeness in social relations and argue that certain human characteristics are universal and fundamentally linked to politeness (examples from Brown & Levinson, 1987, pp. 58-62): 1) Face desires; individuals have the desire to be accepted (positive face) and not controlled (negative face); and 2) Rationality; individuals must know how to reason in order to achieve desirable outcomes. Further, they discuss face-threatening acts (FTAs) for speaker and hearer and identify differences between positive and negative face threats (examples from Brown & Levinson, 1987, pp. 65-68):

Table 2. Face Threatening Acts (FTAs)

Face Threats	**Differences**
Threats to the hearer's positive face	Expressions of disapproval, criticism, contempt, complaints, accusations and insults.
Threats to the hearer's negative face	Orders, requests, reminders, threats, warnings and dares.
Threats to the speaker's positive face	Apologies, breakdown of physical control over the body, self-humiliation, confessions and uncontrollable emotions.
Threats to the speaker's negative face	Expressing thanks, excuses, unwilling promises and offers.

The authors distinguish between positive and negative politeness and identify context-dependent verbal strategies for avoiding FTAs. In brief, positive politeness is the act of making the hearer feel good about themselves. During conversations, the speaker signals that they share the listener's desires by showing respect and treating them as equals. In this way, expectations of FTAs are downplayed. One tactic for positive politeness is to express a mutual understanding of the other person's beliefs, empathy, ethical principles and stance. Negative politeness, on the other hand, is about pleasing and respecting the hearer's need for autonomy.

To compensate for FTAs, speakers can express regret or use other appeasing strategies to give the hearer opportunities to save face. Negative politeness is therefore identified as a way to humble the speaker. In other words, to fulfil the hearer's positive and negative face desires, positive and negative politeness employ verbal strategies to achieve these goals (Brown & Levinson, 1987, pp. 102-103). One verbal strategy for positive politeness is repetition, where the hearer repeats what the speaker has said. Repetition can emphasise emotional approval, for example, by expressing surprise (examples from Brown & Levinson, 1987, p. 113):

Table 3. Repetition for Emotional Emphasis

Interlocutors	**Repetition Example**
Speaker	I had a flat tyre on the way home.
Hearer	Oh God, a flat tyre!

One method of managing negative politeness is to minimise face threats by communicating as literally as possible to meet the hearer's desire to avoid feeling dominated or insecure. However, by adding a few words, the speaker can easily transform an initially informal matter into a critical question that may elicit negative emotions in the hearer (examples from Brown & Levinson, 1987, p. 133):

Table 4. Emotional Effects

From Literal to Judgmental	**Lexical Items and Emotional Effect**
Literal and blameless	Why paint your house purple?
Literal or judgmental	Why *are* you painting your house purple?
Judgmental	Why *in the world are you* painting your house purple?

In this context, the linguistic form indicates sociological valence. That is, social relations can be influenced by communicative purposes. Participants adjust verbal expressions to achieve intentional outcomes, linking social relations and linguistic form to tactical and intentional negotiation. From this perspective, language use is seen as tactical rather than relational (Brown & Levinson, 1987, p. 281). In essence, the authors examine global human patterns

that classify how polite expression is constructed based on self-interest (i.e., face) and its design. They emphasise politeness as a motivation for human interaction.

3.3 Humorous Expression

Raskin defines the semantic conditions for verbal humour and distinguishes between what is perceived as funny and what is not. In particular, humour is influenced by cultural conditions, context, experience and personality traits[8]. The focus is on the antagonistic source of laughter and the contradiction that it can express both negative and positive emotions (Raskin, 1984, pp. 1-11). To define a text as a joke, it must meet two requirements. First, it must contain two different scripts that are partially harmonious with the text. Secondly, these scripts must contradict each other and overlap with the text to some extent. It should be noted that the concept of semantic scripts is crucial. In brief, a semantic script pertains to the mental classification of knowledge regarding concepts, events, people, behaviours and objects, based on personal experiences. Therefore, individuals unconsciously draw conclusions from their perceptions. Jokes are formed when related scripts are perceived as opposites, and it is important to emphasise their ambiguity. As communicative strategies, jokes can be both positive, such as informative, and negative, such as fooling around, deception, or acting. (Raskin, 1984, pp. 81-100).

The process of interpretation is outlined as listed below (examples from Raskin, 1984, pp. 100-101):

- The joke is made by chance: There is no awareness of the ambiguity of the joke. The speaker's communicative strategy is genuine and therefore informative.

- The joke is made on purpose: The speaker is aware of the semantic script overlap and deliberately tries to make someone laugh, act or deceive.

- The joke is not anticipated: The first interpretation is positive and therefore informative. If this fails, the hearer has to find other interpretation strategies to understand the joke.

[8] Linguistic theories of humour have developed since 1984 (see e.g. *The Routledge Handbook of Language and Humour*, 2017. https://www.routledge.com/The-Routledge-Handbook-of-Language-and-Humor/Attardo/p/book/9781032402239), and *f*MRI experiments have been conducted to investigate the processing of verbal humour (see e.g. Chan et al., 2012, https://doi.org/10.1016/j.neuroimage.2012.10.019).

- The joke is anticipated: The hearer pays attention to the joke and interprets it as a joke.

Furthermore, about the polarity of semantic scripts between the true and false conditions they elicit or characterise, three structural variants for jokes have been proposed (examples from Raskin, 1984, pp. 109-111):

Table 5. Semantic Script Polarity

Semantic Script Polarity	Examples of Emotional Potential
An explicit contrast between the protagonist's authentic and illusory worlds.	He is a writer vs. He is not a writer.
The anticipation of a typical case contrasts with a surprisingly atypical case.	The fool is foolish vs. The fool is not foolish.
Something that may happen as opposed to something that may not happen (some or all).	The medicine within the bottle cures headaches vs. The inscription on the bottle cures headaches.

The use of ambiguity and contradiction are considered to be universal triggers for humour, as illustrated in this American joke:

> Is the doctor at home? the patient asked in his bronchial whisper. "No," the doctor's young and pretty wife whispered in reply. "Come right in. (Raskin, 1984, p. 32)

The doctor is the one the patient wants to see so the proposition is inconsistent; it is consistent with infidelity. However, the listener will not understand the joke unless the situation of infidelity is acknowledged. Consistency and inconsistency thus coincide because of the proposition to enter. As Raskin points out, this joke may not be particularly humorous but it highlights the characteristics of jokes in general (Raskin, 1984, p. 32[9]). Jokes have the potential to evoke both positive and negative emotions as they can be simultaneously funny and offensive. As such, the listener's subjective interpretation is crucial in determining whether a joke violates ethical principles.

3.4 Emotional Figurative Expression

Kövecses demonstrates how emotional facets are deeply rooted in figurative language which is influenced by physiological and cultural factors. From this perspective, emotions appear to

[9] See Chapter 4 in Raskin's book for a thorough script analysis of the joke.

be constructed by individuals based on real-life events. Figurative language is used to comprehend and express emotions when literal language falls short. Therefore, figurative expressions of emotion become an integral part of linguistic cultures. The human body is significant in the conceptualisation of emotion. In order to make sense of things, we draw inspiration from the body and incorporate its function and existence into figurative language (Kövecses, 2000, pp. 1-2). Conceptual emotion metaphors are divided into the following categories: Anger, fear, happiness, sadness, love, lust, pride, shame and surprise. Research in this area shows that each emotion category corresponds to specific source and target domains (examples from Kövecses, 2000, pp. 21-34):

Table 6. Source and Target Domains

Source Domain	**Target Domain**
Anger Metaphor ANGER IS A HOT FLUID IN A CONTAINER	She is *boiling with* anger
Fear Metaphor FEAR IS A BURDEN	Fear *weighed heavily on* them
Happiness Metaphor HAPPY IS UP	We had to cheer him *up*
Sadness Metaphor SAD IS DOWN	He brought me *down* with his remarks
Love Metaphor LOVE IS A JOURNEY	It's been *a long, bumpy road*
Lust Metaphor LUST IS A PHYSICAL FORCE	She *knocked* me *off my feet*
Pride Metaphor PRIDE IS A FLUID IN A CONTAINER	The sight *filled him* with pride
Shame Metaphor SHAME IS A DECREASE IN SIZE	I felt *this* big
Surprise Metaphor A SURPRISED PERSON IS A BURST CONTAINER	I just came *apart at the seams*

Humans may share a substantial conceptual structure that enables us to express emotions figuratively. In the present context, this assumption is based on the observation that metaphorical language is commonly used for understanding emotion concepts, both poetically and in everyday speech. It is assumed that these emotion concepts are globally widespread. Research indicates that many cultures share similar concepts for expressing emotions due to the connection between our emotional make-up and physical abilities (Kövecses, 2000, p. 139). In general, subjective experiences are interpreted using figurative language made up of essential ingredients that include bodily, cognitive and cultural factors. These factors are essential to how we consciously feel our emotions.

3.5 Impolite Expression

Culpeper examines impolite expressions and defines impoliteness as "a negative attitude towards specific behaviours occurring in specific contexts" (Culpeper, 2011, p. 23). The perception of what constitutes impoliteness arises when a particular performance does not confirm what is anticipated. Understanding the intention behind offensive behaviour influences the interpretation of how strongly such behaviour is perceived. In this context, the notions of face and social conventions are essential. In Culpeper's view, "face" refers to our positive sense of self including our perceived social significance based on factors such as bloodline, wealth, education, and occupation. Social conventions depend on reasonableness and self-satisfaction, and we make rational decisions based on systems of value to achieve beneficial goals. Habits, customs, addictions and rituals can develop into social conventions if they are consistent. Social commitments are behaviours and actions that we believe we must follow and accept. Impolite expressions can threaten self-image, and social conventions underpin how they are perceived (Culpeper, 2011, pp. 23-25, 31-35).

Intention refers to the link between an individual's opinions, interest in achieving results and subsequent behaviour. However, the emphasis here is on the concept of intentionality which is a combination of intent, aptitude for achieving results, and attention. The latter refers to a state of being consciously aware - at least to some extent (Culpeper, 2011, p. 49). Dysfunctional affective states can lead to emotional abuse and threats, such as when aggression is expressed verbally. The following analysis examines an audio recording of a telephone call (answering machine) between a father and his 11-year-old daughter in which the father directs his seething anger toward her. In this case, affective prosody is particularly important as the man yells to release his anger, reinforcing his blame toward his child (example from Culpeper; bold font signifies forceful syllables):

- you have in**sult**ed me for the **last** time.
- you have in**sult**ed me.
- your mother was a thoughtless pain in the ass […] you have humiliated me for the **last** time on this phone.

These expressions take the form of repetition and then rephrasing (from “insulted” to “humiliated”) while a covert threatening remark is added: “for the last time”. Insulting behaviour is often conveyed through offensive expressions, which are considered traditional verbal strategies of offence. Here, the speaker devalues the addressee through cynical statements, and the use of a second-person pronoun reinforces the devaluation (Culpeper, 2011, pp. 223-224).

Notably, the closing phrase “on this phone” can change the threatening nature of the remark (“last time”) to a joke, making it less offensive. This implies that there may not be a “last time” when he can be humiliated on another phone. The given expression suggests that semantic script polarity (as defined by Raskin, 1984) can arise involuntarily when one is angry, and confirms that emotional triggers can be deeply rooted in other emotional triggers (as discussed by van Berkum, 2019). The use of taboo words (such as "pain in the ass") captures the brain's attention (as noted by Gantman & Van Bavel, 2015, and Struiksma, et al., 2022) and the realisation that the offender is making a fool of himself may initially go unnoticed. Essentially, the speaker is intentionally attempting to elicit negative emotions in the listener.

3.6 Semantic Primitives

The Natural Semantic Metalanguage (NSM) is an analytical framework that utilises a set of basic words, known as semantic primitives, which are not influenced by culture. These primitives are organised into related classifications. Certain words are globally understood to represent universal concepts, such as the semantic primitives GOOD and BAD, which are classified as universal evaluators. Despite significant linguistic differences, it appears that the world's languages share a common set of linguistic arrangements that utilise specific words to construct particular sentences (Wierzbicka, 1999, pp. 35-39). Certain languages contain linguistic arrangements that convey emotional meaning, such as the range of sentimental ideas expressed in the phrase: “I know: something bad happened” (Wierzbicka, 1999, p. 38). These arrangements can allow for alternative interpretations, such as self-blame, isolation, unwanted effects, and critical language, which may not accurately represent the emotion of sadness. The

NSM aims to simplify complicated concepts, recognise differences between what is required and what is not, and identify unchanging meanings. For example, while there are Russian words that can be translated as "sadness", each of them carries a specific connotation. Crosslinguistically, each Russian and English emotion word has no common psychological context. The NSM can be used to recognise emotion concepts both between and within languages (Wierzbicka, 1999, pp. 39-40, 45).

Studies confirm that emotion concepts generate different conceptual simulations in the minds of individuals across languages and cultures. However, a group of emotion concepts may be universal (examples from Wierzbicka):

Table 7. Universal Emotion Concepts

Universal Emotion Concepts	**Conceptual Simulations**
A *word* for FEEL	Words showing no difference between bodily sensations and emotions. E.g., in English, I feel like this now
Expressing feelings	I feel good, I feel bad
Links between feelings and the body	Words for *smile* and *cry*
Facial universals	Inferring common facial muscle activity
Emotive interjections	Expressing immediate thoughts. E.g., in English; *gee*, *wow*, and *yuk*!
Emotion terms	E.g., fear, anger and shame
Three recurring themes	Fear-like, anger-like and shame-like words
Blurry lines between emotions	Fear-like emotions vs. shame-like emotions
Good feelings	Words for positive mental states
Emotions described via external bodily symptoms	In English, words like *blush* and *pale*
Emotions described via sensations	E.g., when I saw/heard this, I felt hot/cold
The grammar of "emotions"	Ways of describing emotions (in English): He was angry/sad/happy/afraid. She was worried/disgusted/surprised/amazed/ashamed

The subjective evaluation of emotions is documented in human languages worldwide, often using the word combination FEEL and GOOD/BAD (Wierzbicka, 1999, pp. 274-305).

3.7 Affective and Virtuous Expression

Through narrative, 't Hart explores the human ability for evaluation and simulation in language comprehension, focusing on grounded cognition. Facial EMG is used to test whether there are competing elements between these cognitive processes. Three possible models for the simulation-evaluation interaction in frowning muscle activity are proposed:

- Model 1: Only simulation

The model predicts that the frowning muscle will be activated when simulation is influenced by language. However, given our automatic evaluation, it is very unlikely that this situation will occur. To support this argument, ‘t Hart refers to the work by van Berkum et al. (2009), who found that language processing occurs very quickly (200-250 ms after word onset) when reading about concepts that violate one’s ethical principles (’t Hart, 2017, pp. 20-22).

- Model 2: Simulation gets blocked by evaluation

Conversely, this model suggests that the frowning muscle is only activated during the evaluation of emotion concepts. One possible reason for this could be that simulation is overpowered by evaluation. However, there may be simulation that EMG is unable to detect (’t Hart, 2017, pp. 20-22).

- Model 3: Several factors

The third alternative is that both simulation and evaluation produce frowning muscle activity. They may occur simultaneously or in a quick sequence. If they do not occur together, simulation is most likely to activate the frowning muscle before evaluation overpowers it. To illustrate, when reading about a socially accepted emotion concept, a positive simulation may be followed by a negative evaluation according to the reader's ethical principles. However, if simulation and evaluation simultaneously trigger the frowning muscle, a reduced reaction may occur due to the conflicting activation of facial muscle activity. To detect a reduction, the frowning reaction should be examined in a context where simulation and evaluation do not conflict. The models have been tested and suggest that simulation by its self cannot explain frowning muscle activity (’t Hart, 2017, pp. 20-22).

The linguistic expressions of emotion in this study refer to a narrative of a male character's encounter with events that describe outcomes of moral or immoral reactions and emotional responses (examples from ‘t Hart, 2017, p. 26):

Table 8. Reactions and Emotional Responses

Moral or Immoral Reactions	Positive or Negative Responses
Mark slows down to avoid the puddle, making sure he does not splash the pedestrian.	Mark is happy when he immediately spots a petrol station and he avoids being stranded.
Mark accelerates through the puddle on purpose to create a big splash and soak the pedestrian.	Mark is frustrated when there is not a petrol station in sight and he becomes stranded by the roadside.

In essence, the EEG results from this study indicate that participants affectively evaluate and ethically simulate the texts (’t Hart, 2017, p. 114).

3.8 Summary

For decades, linguists have studied linguistic expressions of emotion. The approaches presented here are just a few of the linguistic expressions that illustrate how language and emotion interact: Syntax typically includes emotion verbs and prepositions associated with emotion. Evaluative affixes are found in morphology. Emotional prosody includes the auditory sensation of sarcasm in phonology. In pragmatics, speech acts and emotive implicatures are analysed. As we shall see, the linguistic expressions above relate to the Norwegian ruling’s punishable verbal offence.

4 Relevant Research Methods

Research methods have their advantages and disadvantages and can vary within the same field of study. The aim here is to highlight research methods specifically used in the study of affective language comprehension.

4.1 Electroencephalography (EEG)

A widely used technique for investigating emotion and affect in language comprehension is brain wave recording. Electroencephalography (EEG) is a method of recording the brain's

electrical fields using a cap with electrodes, with minimal intervention. When electrochemical signals move from one nerve cell to another, electrical fields are created. These fields can only be measured outside of the scalp when they are comparatively high which occurs when a large number of electrochemical signals move at the scale of a neural network. However, little is known about what the EEG signal actually contains and it is challenging to quantify smaller and unsynchronised neural activity using EEG. As a result, EEG provides a poor level of detail which is a major drawback (Cohen, 2017, pp. 208-209). It is worth noting that although EEG only reveals a fraction of brain activity, it can still detect physical movements linked to mental function or disability as they occur. Temporal accuracy and non-invasiveness of EEG are clear advantages and the EEG cap is well tolerated regardless of the age of the participants. EEG is therefore a very advantageous method and can also be used in combination with additional brain scans such as MRI. Importantly, EEG is used both for brain scanning and for recording brain activity (Biasiucci et al., 2019, pp. R80-R84).

4.1.1 Event-Related Brain Potentials (ERPs)

When studying the brain's electrical activity during specific mental processes, it is not usually possible to see raw EEG data. Instead, it is more useful to observe brain function by examining event-related brain potentials (ERPs). Simply put, ERPs reflect brain activity triggered by external stimuli such as words. They are low intensity and therefore not observable in naturally recorded EEG, so they must be separated. To estimate the real response to the stimulus, the recorded EEG is averaged over time which eliminates irrelevant oscillations and variations and results in the participant's electrophysiological (ERP) wave. In other words, the wave is obtained from ERPs that are locked in time to a repetitive stimulus. In this sense, time is fundamental to this type of research into language comprehension; the primary focus is on reaction times because the performance of brain activity for a particular assignment needs to be accounted for in EEG exactly when language comprehension occurs. In essence, ERPs are the remaining brain activity after non-essential signals have been filtered out (Luck, 2014, pp. 6-9; Beres, 2017, pp. 248-249).

An ERP has various components (i.e., peaks or troughs), including the N400 component which reflects meaning, and the LPP (Late Positive Potential) component which reflects emotional strength. In language research, the N400 is considered an important and reliable detector of semantic irregularities and unlikely but plausible endings. More specifically, after the introduction of a meaningful word, for example, "I take coffee with cream and dog" (Kutas & Federmeier, 2011, p. 622), there is a constant peak in negative

curvature around the 400-millisecond mark (Kutas & Federmeier, 2011, pp. 622-624). As such, the N400 is related to typical language comprehension showing that the brain very quickly detects semantic errors, as well as who or what is being referred to. This component thus reflects how the brain perceives a line of text and anticipates spoken words in context before they are fully uttered (van Berkum, 2008, pp. 377-378). In contrast to the N400, the effectiveness of the LPP component as a reliable measure is still debated, although it is most often affected by emotion. In short, language research has shown (see e.g. Citron, 2012 and Struiksma et al., 2022) that the voltage of the LPP tends to rise when stimuli elicit emotional responses. Thus, an understanding of the mechanics of the LPP can be useful in understanding how the brain responds to stimuli relevant to motivation and emotion (Brown et al., 2012; Fields, 2023).

4.1.2 fMRI and Facial EMG

- **fMRI**

In neuroscience, functional magnetic resonance imaging (fMRI) is a powerful method of studying brain activity; it is a system equivalent to magnetic resonance imaging (MRI). Neuroimaging research sheds light on feelings, human thoughts and behaviour by investigating neural pathways involved in specific operations. It gives neuroscientists access to the subconscious mind. In simple terms, fMRI monitors fluctuations in the bloodstream, allowing researchers to obtain a substitute measure of cognitive processing. However, a significant drawback is that the data produced can be confusing and requires skilled analysts with advanced software to analyse properly. Another restriction is that researchers cannot usually detect a cause-and-effect relationship between behaviour and brain stimulation. Due to individual differences, neuroimaging studies have focused on groups to identify general tendencies. Researchers have also used fMRI to study moral intent, shedding light on the neural network of morality and the theory of mind (ToM) (Sahakian & Gottwald, 2016, pp. 1-9). Therefore, the ability to understand the thoughts and intentions of others is a crucial factor for moral evaluation relevant to affective language comprehension research (see e.g. Bašnáková et al., 2015).

- **Facial EMG**

One technique for analysing facial muscle activity is electromyography (EMG). Signals from EMG can provide valuable insight into the affective displays of human faces and are measured from muscles involved in conveying basic emotions such as anger, fear, sadness,

disgust, and happiness (e.g. the frowning and smiling muscles). EMG signals have a very good time accuracy making it possible to precisely track sudden variations in facial muscle activity. Also, facial muscle reflexes too weak to be observed can be detected by EMG as the signals are highly responsive. But despite the sensitivity of the signals, it is still challenging to accurately discern between negative and positive emotions. Another drawback of using EMG is that facial muscle activity reflects movements that cannot necessarily be related to affective states, e.g., excitement for sense data or brain exhaustion (van Boxtel, 2010, pp. 104-107; van Boxtel, 2023, p. 370). Even so, facial EMG can be a helpful tool for researchers investigating affective language comprehension as it can trace affective responses to linguistic stimuli (see e.g. ’t Hart et al., 2018).

4.2 Electrodermal Activity (EDA)

Electrodermal activity (EDA) is a label for defining separate variations in the electrical transmission of the human skin. In measuring event-related sweat gland activity, skin conductance (SC) is typically used. To estimate SC, electrodes are applied between two places (e.g., middle or outer knuckle joints) of the opposite hand to measure the current of electricity between the two, and to determine the electrical skin responses. This method is extensively used to quantify levels of arousal throughout cognitive and emotional processes. The EDA signal is affected by the hypothalamus which controls sweating (temperature regulation) and is linked to the limbic system responsible for behavioural and emotional processing. Notably, palms and armpits seem more vulnerable to emotional provocation (Greco et al., 2016, pp. 1-5, 12-16). For research on affective language comprehension, the utilisation of SC can aid researchers in gauging the affective stimulation directly related to different forms of language use, e.g., compliments and insults. One example is a study of insulting language by Struiksma et al. (2022).

4.3 Unique Traits Investigation

Researchers in the field of affective language comprehension have utilised questionnaires to examine individual differences focusing on traits such as empathy, sympathy, and the ability to feel for characters in stories. The purpose is to gauge the participant's instinct for narrative transportation and moral evaluation when participating in relevant research projects (see e.g. ’t Hart et al., 2018, and Struiksma et al., 2022). Assessing empathy, a crucial aspect of collaborative behaviour, requires an effective and reliable measure. In other words, scientific concepts must be measured with significant reliability and tolerate comprehensive validation.

One such scale available is the Adolescent Measure of Empathy and Sympathy (AMES) which, unlike other scales, distinguishes between sympathy, and cognitive and emotional empathy (Vossen et al., 2015). Aspects of narrative transportation involve imagination, the ability to maintain concentration and affective impact. As transportability differs in people, the Transportability Scale can predict who finds narrative attraction quite convincing (Dal Cin et al., 2004, pp. 183-184; Green & Brock, 2000, p. 704). In this context, it is worth noting that both AMES and the Transportability Scale are utilised in conjunction with EEG recordings.

4.4 Summary

EEG is a method widely used to study brain function useful for investigating reaction times and patterns of brain activity, and provides valuable insight into language processing and other cognitive processes. Be mindful that research can generalise rather than show individual variations. Essentially, researchers can improve their chances of finding reasonable explanations for affective language comprehension by utilising different methods within the same research project.

5 The Affective Language Comprehension Model: A Review

5.1 Introduction

The Affective Language Comprehension model (the ALC model) by J. J. A. van Berkum, made its debut in *The Oxford Handbook of Psycholinguistics* in 2018 followed by its inclusion in *The Oxford Handbook of Neurolinguistics* in 2019. The ALC model contributes to a transformation within these fields by offering a comprehensive framework for understanding how emotion and affect impact language comprehension. The question is whether emotions can be considered insignificant to language processing and comprehension. As the ALC model focuses on the interaction between language and emotion, it is guided by the importance of human collaborative efforts and the emotionally attuned communicator. The model proposes key components of *the speaker's communication strategies* and requires the addressee to infer these components in a face-to-face interaction, demonstrating where emotions can emerge and the influence affective states can have on language comprehension. This process involves the identification and analysis of spoken and unspoken signs, determining references and concluding intentions, attitudes, motivation, and relevant complementary layers of meaning. These components should have individual access to the brain’s emotional circuitry and be tested in a language lab. As such, the model aims to assist

advancements in psycholinguistic and neurolinguistic research while linking the distance between linguistics and other disciplines (van Berkum, 2019, pp. 759-760).

Regardless of the expanding scientific interest and research dedicated to exploring the relationship between language and emotion, the ALC model demonstrates that this specific relationship's impact on the field of psycholinguistics is still limited. In the current context, no existing theory is found that adequately explains the complex interplay between language and emotion during language processing and comprehension. Hence, our understanding of how words have profound effects remains difficult to pin down. Because of the complex linkage between language and emotion, the author suggests that focused attention from the field of psycholinguistics and related disciplines is necessary. Recognising and acknowledging this complex relationship is needed as neglecting it would be a huge disadvantage. In psycholinguistic research on language processing, emotion has historically been overlooked. The primary attention has been more technologically oriented, and the computer serves as the creative stimulus overshadowing research about emotions (van Berkum, 2018, pp. 645-646; van Berkum, 2019, pp. 737-738).

5.1.1 Language Processing and Conventional Methods

The author directs focus toward the computer's groundbreaking influence and Alan Turing's work, the "Imitation Game", first published in 1950 when Turing explored the concept of machine intelligence and the ability to think (Turing, 2009, pp 23-24). Theories addressing this kind of digital information processing introduced fundamental principles encompassing signs, cognitive models of the surrounding environment and the regulations that manage them. They also shed light on memory, both its stable and adaptive aspects. Research on human communication introduced concepts related to the constraints of communication mediums which included encoding, delivery, and subsequent decoding of information (van Berkum, 2018, p. 646; van Berkum, 2019, p. 738). In this context, Shannon and Weaver are cited who, back in 1949, introduced a mathematical model that influenced the understanding and analysis of human communication. Their model provides a framework for the transference of information drawing parallels with the technical structures of a telephone system (van Berkum, 2018, p. 646; Shannon & Weaver, 1949, pp. 33-35).

The gradual introduction of technological concepts into psycholinguistics, the author argues, has instigated inquiries on how language users make sense of noisy linguistic stimuli during comprehension, how they store and recall word-level representations, and how they

recreate the grammatical structures of utterances, among other factors. This technological approach has failed to inspire psycholinguists to investigate the complex interplay between language, emotion and other affective states. Over the years, grammatical approaches have also demonstrated a lack of interest in investigating the actual impact of emotion and affect on language comprehension. Instead, the emphasis has been primarily on the generative linguistic framework and the processes involved in language processing in the brain. Consequently, the significance of language use in face-to-face interactions has been overlooked (van Berkum, 2018, p. 646; van Berkum, 2019, p. 739).

Another significant influence is Fodor's idea that language is one independently functioning unit in the brain alongside other systems, which he refers to as "modules" (Fodor, 1983, p. 47). As the author notes, separate from the language user's interpretation of any emotional value, language comprehension is considered the cognitive operation of determining explicit and implicit meaning. However, prioritising discipline-specific subjects can lead to disregarding other fundamental aspects of what it means to be human. This includes not only aspects specific to human beings but also essential factors we share with other animals like emotions and memory to acquire a more nuanced understanding of how the language system operates. Unfortunately, these views have created challenges in recognising the relevance of emotions within the field of psycholinguistics. As a consequence, they have unintentionally encouraged a one-sided perspective on language use, representing human communication as an *unemotional code-based construct*. In other words, an alternative approach to language use in the context of computational science is the "TCP/IP perspective" (van Berkum, 2018, pp. 646-647; van Berkum, 2019, pp. 739-740).

TCP/IP stands for The Transmission Control Protocol/Internet Protocol and is considered the driving force behind global networks and the Internet. This protocol is fundamental as it regulates information exchange among electronically connected computers. In this particular scenario, humans engage in information exchange following a predefined procedure characterising them as computational entities. Following the author's viewpoint, this outlook has gained preference in psycholinguistic and neurolinguistic tutorials and encompasses multiple actions related to operating and processing data in communication. On the one hand, to understand and map how the brain understands and processes language, cracking the language code is crucial. On the other hand, there is a deeper layer to consider because humans are not unaffected mechanical beings passing on facts and data. Instead, we encourage connections with the world around us, utilise language to nurture these bonds,

discarding those that do not serve us and creating new ones. In this way, it is argued, at the centre of it all we find emotions (Parziale et al., 2006, p. 1; van Berkum, 2019, pp. 739-740)

5.1.2 Opening to Emotional Phenomena

Emotions, affect and moods are considered to be related, yet distinct psychological abstractions. As these ideas are widely used phenomena that refer to complex multifaceted experiences within the human organism, this subsection begins with an overview of the ALC model's definitions for easy reference. The definitions integrate elements from various proposals within the field of emotion science:

- Emotion

  An emotion is a package of relatively reflex-like synchronized motivational, physiological, cognitive, and behavioural changes, triggered by the appraisal of an external or internal stimulus event as relevant to the interests (concerns, needs, values) of the organism, and aimed at generating a prioritized functional response to that stimulus event. The changes involved need not emerge in consciousness, but to the extent that they do, they give rise to feeling. (van Berkum, 2019, p. 741)

More precisely, the author's definition mirrors Scherer's characterisation of emotion (Scherer, 2005, p. 697).

- Feeling

Feeling is considered the conscious perception of emotional responses from the inner and outer worlds. Sensing emotions within conscious awareness facilitates us to feel them and thus manage them (van Berkum, 2018, p. 649).

In particular, this formulation aligns with Adolphs' perspective (Adolphs, 2017, p. 24).

- Mood

Moods necessitate a gradual change in the underlying emotional state that is not inherently tied to a specific explanation, but rather a representation of how an individual experiences life as a whole. In this way, moods contrast with fleeting emotions (van Berkum, 2019, pp. 744-745).

- Affect

The author refers the reader to Barrett and Bar, among others, for a definition of affect (van Berkum, 2018, p. 651; van Berkum, 2019, p. 744). From a psychological constructionist perspective, Barrett and Bar emphasise that affect[10] pertains specifically to the capacity of something to impact the state of the human body. For example, conscious emotional sensations are closely related to a range of psychological and physical cues that the organism deems important (Barrett & Bar, 2009, pp. 1327-1328). Barrett states that "Affect is the general feeling that you experience throughout each day. It is not emotion but a much simpler feeling with two features" (Barrett, 2017a, p. 72). Barrett defines valence and arousal as the two features that describe a basic feeling that is always activated; valence refers to the degree of pleasantness or unpleasantness felt, while arousal represents the level of calmness or arousal felt (Barrett, 2017a, p. 72). In other words, affect can be defined as a core feeling component of valence (positive, negative or neutral) and arousal.

Emotions arise when something is evaluated as significant to one's needs, the author explains. While individuals may struggle to pinpoint the exact reasons for their emotions, emotions are inherently referential because they relate to something specific. Interestingly, we can react affectively without consciously recognising the stimulus. Stimuli can be either positive or negative and originate from the external environment or from within the mind. Based on insights from a variety of emotion scientists, the ALC model explicitly makes a distinction between *evaluation* and *emotion* because evaluation can to a certain degree be intentionally controlled, whereas emotion tends to appear unconsciously, instinctively and swiftly (Damasio, 2010, p. 85; van Berkum, 2018, pp. 648-649; van Berkum, 2019, pp. 741-742). In this context, the author draws attention to emotion scientists such as Lazarus (1991), Scherer (2005), Damasio (2010), and Adolphs (2017), and encourages the reader to independently explore their definitions of emotional phenomena for a more comprehensive understanding.

In line with his definition of emotion, the author provides a thorough examination of nine characteristics that define emotional phenomena before introducing the ALC model. These characteristics are considered crucial. Following several neuroscientists, the brain's affective networks serve as an adaptive mechanism that controls behaviour by managing our moods, emotions and how we evaluate (van Berkum, 2019, p. 741). In the following

[10] As earlier stated, there are various definitions of affect.

summary, I outline these fundamental emotive characteristics considered relevant to language research.

- **What are emotional triggers?**

Anything, in fact: When something is valued as meaningful to the human system, emotions are activated. Figure 28.1 (van Berkum, 2018, pp. 648-649) is an illustration of how an emotional event can occur. Emotions have referents, which can be about anything including words, but their triggers can remain concealed. Whatever activated the emotional event, multiple emotions may occur together with or without awareness. Even though our emotions are not always consciously perceptible, the human organism is adept at managing them appropriately (van Berkum, 2019, p.741). In this context, the author refers to experimental research by Li et al. demonstrating that unconscious smell can impact our evaluation of other people's faces in social interactions. This idea is not new. Its roots can be traced back to ancient Greece, and their research reaffirms those long-held assumptions that have persisted throughout human history. Scent seems to have the most significant effects when it is not consciously perceived. Their findings suggest that significant details may escape effective adjustment and impact societal evaluation when sensed information is scarce (Li et al., 2007, pp. 1044-1048). Additionally, the author points to Tamietto et al. who state that the notion of "emotional contagion" refers to our innate inclination to unconsciously coordinate our facial expressions. The main question is whether emotional contagion is driven by what we consciously experience visually from a triggering input (Tamietto et al., 2009, p. 17661).

- **How may an emotional event unfold?**

In a sophisticated way: The ALC model presents a recipe for understanding an emotional event. It outlines the various components that may be involved in the following sequence: Triggers, automatic and immediate evaluation, the grouping of emotional actions, and the conscious interpretation of emerging emotions (i.e., personal feelings). The grouping of emotional actions is the variation of behavioural patterns in the areas of motivation, physicality, cognition, and behaviour. When triggers initiate the emotional event, they set off a chain of processes that unfold in a specific way. Automatic and immediate evaluation follows as the brain determines the meaning and significance of the trigger. This evaluation leads to activating emotional actions, which consist of distinct mental and physical responses corresponding to each specific emotion. In particular, it is noted that feelings are present when

emotions arise because conscious feelings allow us to emotionally regulate (van Berkum, 2018, p. 649; van Berkum, 2019, pp. 741-742).

Motivation, physicality, cognition, and behaviour are altered by emotions. Motivational alterations involve preparing oneself for certain actions or freeing oneself from unwanted situations. Physical alterations manifest as bodily preparations to deal with the impact of the emotion. Cognitive alterations relate to modifications in memory and attention. Behavioural alterations encompass distancing or approaching something or someone, and the outward manifestations of emotion such as facial expressions and body language. Throughout this process, individuals experience the conscious interpretation of their emotions - *feelings*. In other words, feelings are interpretations that provide a personal understanding of the emotions during the emotional event. Essentially, the ALC model's proposal for a comprehensive description of an emotional event incorporates 1) Triggers; 2) Automatic and immediate mental evaluation; 3) The grouping of emotional actions; and 4) Feelings, and all of this happens at once (van Berkum, 2018, p. 649; van Berkum, 2019, pp. 741-742).

- **What do emotions control and why?**

Emotions control the distinction between good and bad, enabling us to act: Viewing emotions as illogical could lead us to overlook their role as valuable sources of information because emotions tend to your welfare and guide you away from danger. Typically, when the brain generates emotions, it is for taking care of what is in your favour and, therefore, emotions call for immediate actions to get your needs met (i.e., physical, psychological and emotional needs). Without awareness, we attach value to everything, but the question arises: Why? (van Berkum, 2018, p. 650; van Berkum, 2019, p. 742).

In this regard, the author highlights the work of several influential scientists. According to Damasio, the purpose of life is to be happy and sustain happiness. Because chemistry in the body is striving for emotional balance to achieve a positive state of being, which is necessary for survival. But mere survival is not enough, the key is to flourish. As a result, the human organism seeks a state of emotional harmony to achieve the ultimate feeling of happiness (Damasio, 2010, p. 256). In many ways, Panksepp and Biven are saying the same thing, discussing ancient foundations of collective happiness and directing attention to the inherently natural playfulness of children (Panksepp & Biven, 2012, p. 372). Adolphs' point of view is that emotions have evolved to help us deal with challenges we encounter in our internal and external environment to adjust and manage our behaviour. Consequently,

emotions are closely linked to other cognitive processes such as learning and memory (Adolphs, 2017, pp. 25-27). As a final note, Barrett's view seems to be that our brain and sensory apparatus are sensitive to previous emotional encounters, as well as being situationally dependent on cultural conceptions of emotion to create meaning (Barrett, 2017a, p. 296).

- **Do emotions only appear consciously?**

Emotion scientists say no: Many emotion scientists agree that emotions can effectively manage and perform their functions while operating below the level of consciousness. For this reason, one might think that it is not necessary for us to feel emotions because they do their job anyway. So, all the components of an emotional event, proposed by the ALC model, can easily pass us by unless emotions appear very powerful. A possible consequence of the inability to consciously feel emotions is that reflecting on your own evaluation and behaviour while an emotional event is occurring becomes more difficult. Physical movements and other sensations in the body resulting from the ongoing event may also go unnoticed, and the conscious mind may miss out on crucial information (van Berkum, 2018, p. 650; van Berkum, 2019, pp. 742-743).

- **What is the connection between emotions and learning?**

Triggers, deeply rooted biologically in the human brain: These natural triggers are emotionally sufficient, such as loud sounds, facial expressions, and physical and mental discomfort, to name a few. But new triggers can make connections via emotional learning and thus become emotionally intelligent just like the biological ones. According to De Houwer et al., the results of many studies show that the concept of "evaluative conditioning" is a reliable cognitive tactic for learning through association. It is a mental construct that alters aversion or preference when actively engaged with different types of stimuli, whether negative or positive (De Houwer et al., 2001, pp. 853, 866). Hofmann et al. state that our behaviour is considerably dictated by our preferences. As such, our preferences profoundly shape our emotional stability because they have a huge impact on cognitive functions such as memory, attention and how we decide what to believe (Hofmann et al., 2010, p. 390). Under these conditions, the author mirrors, for example, Panksepp and Biven (2012) in referring to the phenomenon of "emotional conditioning", highlighting the critical role of the amygdala; without conscious remembrance, the amygdala can create emotional connections. With this in mind, Janak and Tye provide a comprehensive explanation of the amygdala, the role it plays

in our behaviour and how emotional valence is interpreted. As the amygdala is linked to health disorders such as anxiety, autism and addiction, it is of the utmost value to recognise its circuitries (Janak & Tye, 2015, pp. 284, 287). At the same time, other parts of the brain network relevant to emotion are likely to be activated. Artificial indicators, such as catchy phrases, can also become emotional triggers when combined with stimuli that the human mind evaluates as beneficial or detrimental - a situation heavily exploited in marketing to influence consumer behaviour (van Berkum, 2018, pp. 650-651; van Berkum, 2019, pp. 743-744; Panksepp & Biven, 2012, p. 236).

- **What does "affective evaluation" refer to?**

Severely weakened emotions: When we evaluate affectively, the emotional experience is very weak. Research in psychology and neuroscience shows that we very rarely have a neutral perspective on things. In line with cognitive neuroscience, your interpretation of what you perceive in your internal and external worlds corresponds to what matters to you. As Barrett and Bar insist: "people do not come to know the world exclusively through their senses; rather, their affective states influence the processing of sensory stimulation from the very moment an object is encountered" (Barrett & Bar, 2009, p. 1331). In this chapter, the author refers readers to Zajonc, who presents evidence showing that even without memories of previous encounters, people can reliably separate their affective preferences and aversions. That is, the human organism shows immediate affective responses to stimuli. Zajonc explores the distinctions between evaluations based on mental cognition and immediate sensory experience, and those based on affect. This suggests that when we process information, cognition and affect interact but operate separately. Therefore, we cannot avoid responding and reacting emotionally, as they are largely involuntary. The author emphasises that an instant sense of preference or aversion inevitably arises when we encounter someone. In particular, when we make an affective evaluation, it does not feel like a mere state of being but more like a characterisation of the trigger that makes us favour one option over another (van Berkum, 2018, p. 651; van Berkum, 2019, p. 744; Zajonc, 1980, pp. 151-156).

- **What is special about moods?**

Moods have enduring features that correspond to personal circumstances without specific reference: The author points out how Forgas makes distinctions between emotions and moods. From this point of view, emotions have temporary but clear references such as joy, sadness or fear. Moods, on the other hand, differ in that they cannot be specifically localised and last

over time. As such, moods generate core valence as when you simply feel good or bad but cannot pinpoint exactly why (Forgas, 1995, p. 41). Positive and negative moods have distinctive impacts on cognition and behaviour. Zadra & Clore, among others, state that a positive mood puts us in an exploratory mindset reducing the tendency to overestimate barriers and challenges (Zadra & Clore, 2011, p. 676). Park and Banaji also point to experimental studies showing that passing mood shifts systematically and impacts our interpersonal interactions and cognitive functioning. It seems that moods affect how we judge others uncritically, leading us to adopt a judgmental or polarised attitude toward them (Park & Banaji, 2000, p. 1009). Citing Rowe et al. (2007), the author notes that moods have varying effects on our memory and concentration (van Berkum, 2018, p. 652; van Berkum, 2019, pp. 744-745).

- **A note on neurological wiring**

In the context of this model, investigating how the brain processes language is a complicated task and is therefore left unspecified. However, the emotional and physical connections between mind and body are briefly discussed, which are of great importance in experimental studies. Here, readers without a background in neuroscience will have to familiarise themselves with complicated neuroscientific terminology. In this chapter, the emphasis is on the role of the amygdala, hypothalamus, insula and periaqueductal gray (PAG). That is, the subcortical structures and different areas of the neocortex (van Berkum, 2019, pp. 745, 747). For example, Panksepp and Biven provide an overview of the terminology used with a detailed description of the brain regions that they suggest are engaged in emotional and affective processing (Panksepp & Biven, 2012, pp. 1-5). Pessoa also offers a model of the brain's emotional circuitry, predicting that the standard patterns of how the brain processes emotion and affect involve the incorporation and propagation of signals. These patterns are considered to be extremely context-dependent and connected to action with the underlying emotion, perception, motivation and other cognitive functions (Pessoa, 2017, p. 357). LeDoux and Phelps present a thorough investigation that sheds light on the quest to understand how the brain processes emotions from a historical perspective, followed by how the amygdala operates as a critical emotional processor. They discuss various aspects of fear and its impact on cognitive processes, along with other negative emotions (LeDoux & Phelps, 2016, pp. 159-166). Ultimately, the author concludes that the existence of emotions is not biologically *coincidental* (van Berkum, 2019, pp. 745-747).

- **How do emotions serve us?**

They shape and steer our behaviours and preferences non-stop: The human inner emotional landscape contains passionate and delicate experiences that emerge voluntarily or involuntarily. It is a landscape that influences overwhelming reactions and preferences for specific individuals, concepts or things. In this regard, the author cites Frijda who sees emotion and affect as motivational drives that express desires and signify longings. Emotion is a *dynamic force* that goes beyond emotion-laden words. Expressed through action verbs, such as "defend" and "protect", emotion is highly informative, communicating our deepest concerns and empowering us to set healthy boundaries. All aspects of our lives are controlled by the motivational drives behind moods, evaluations and emotions. Because motivational drives must be exceptionally powerful, readers are encouraged to explore the notion of "micro-valence". Lebrecth et al. found that we subtly appraise the positivity or negativity of everything we sense in our environment. That is, delicate emotional valence is extremely common. Hence, emotional phenomena can still exercise control without overwhelming strength (Frijda, 2013, p. 137; Lebrecth et al., 2012, pp. 1-4; van Berkum, 2019, pp. 745-746).

Furthermore, emotion and affect not only impact the way we behave and what we do but also profoundly shape the way we think. Many scholars posit that emotion and affect play a crucial role in inspiring the convictions we adopt, and significantly influence how we reason and make decisions. They are intricately linked to learning by association, memory and attention mechanisms, making them crucial to how we function psychologically and cognitively. In this chapter, the reader is encouraged to explore for further information several scholars who argue that our ability to evaluate and the role of our emotions are crucial when we reason and make decisions. To support this argument, the author points to research on how we draw on previous encounters to envision future possibilities when making decisions (Bechara, 2009; Damasio, 1994), studies of our unique gut instincts (Gigerenzer, 2007), and other work on how emotions influence our decision-making (Phelps et al., 2014). After all, emotion, affect and evaluation enable us to influence others, as does our unique ability to understand language (van Berkum, 2018, p. 652; van Berkum, 2019, pp. 745-746).

5.1.3 Language and Emotion Interaction

The ALC model provides valuable support for psycholinguistic and neurolinguistic research in demonstrating language and emotion interaction. This is particularly beneficial given the complexity of language comprehension as emphasised in psycholinguistics and pragmatics. It

submits that language research within cognitive neuroscience has neglected the crucial role of context in language comprehension. Language interpretation requires navigating through multiple levels where language is just one mode of expression among other cues such as tone of voice, facial expressions and gestures, as well as various writing styles. Researchers should develop a detailed and systematic model to ask more accurate questions about the neural connections between language and emotion, building on Willems' assertion of the importance of context for understanding cognition (Willems, 2011, p. 4; van Berkum, 2018, pp. 652-653; van Berkum, 2019, pp. 747-748).

Particularly, the author proposes a set of key components essential to language comprehension (see subsection 5.4 for more details) which draws on relevant research in neuroscience and cognitive science enriched by the contributions of several scholars such as Jackendoff (2007), Clark (1996), Levinson (2006), Enfield (2013), Trueswell and Tanenhaus (2005), Tomasello (2008), Zwaan (1999), and Kintsch (1998). The key question is: *How rapidly do emotions emerge during language comprehension?* To demonstrate the swift appearance of emotions, the 2018 version of the model employs a highly emotional example of verbally abusive behaviour (example from van Berkum, 2018, p. 653):

(1) a. You're a real <u>bitch</u>

Conversely, in the 2019 version, the example sentences are emotionally toned down, illustrating that emotions can emerge rapidly irrespective of the usual emotional impact that an explicit verbal offence might elicit. The model thus serves two purposes: First, it provides a comprehensive description of the proposed key components involved in language comprehension. Secondly, it explores experimental studies of the speed with which emotions can emerge during the language comprehension process. In this version, the author examines three expressions and asks what specific emotional impact they may have on the addressee (examples from van Berkum, 2019, p. 748):

(2) a. Even *John* thinks <u>euthanasia</u> is acceptable in this case

b. We've run out of <u>dog</u> food

c. The <u>number 7</u> is *also* a prime number

The underlined words and their conceptual and linguistic characteristics are elicited from the addressee's memory, which then determines how the expressions are critically analysed. In

essence, personal emotional associations are linked to words (van Berkum, 2019, pp. 747-748).

5.2 Modes of Communication

The ALC model highlights that interpersonal communication is inherently multimodal in that we always use a combination of spoken and unspoken signs. However, multimodality for communication purposes is a complex matter. As the ALC model does not explicitly elaborate on the complexities of multimodality, it is assumed that readers have sufficient knowledge of the crucial role of multimodal meaning-making in the language comprehension process. Given this background and the fact that the author makes it clear that language and emotion are coupled processes of meaning (van Berkum, 2019, p. 736), the role of emotional body perception in language comprehension may be underestimated. Importantly, language is only one communicative method involved in conveying and making meaning, and to fully understand meaning it is necessary to consider every part of the unspoken sign systems. I will draw some insights from de Gelder, who argues that translating facial cues and body language can be challenging because they offer room for a variety of interpretations. Rather than being synchronised, these signals can sometimes clash. Perceiving the languages of faces and bodies as harmonious resources can therefore lead to considerable misunderstandings (de Gelder, 2009, pp. 3478-3479).

Situations in which interlocutors suffer from brain lesions, mental illness, emotion deficits, other conditions, or a combination of these, which emotionally affect language comprehension in a significant way, are not elaborated in the ALC model. While the interpretation of the intention behind an utterance need not exclusively rely on spoken signs, the model overlooks the challenges faced by people who may not be able to interpret body language and other unspoken cues, such as the deaf and the blind. Nevertheless, the multimodality of spoken and unspoken signs is crucial to language comprehension and interpretation because of their unique properties (see Fig. 1, van Berkum, 2019, p. 749).

Moreover, the author directs readers to researchers who study the various spoken and unspoken signs and symbols we use in interpersonal communication. For example, Clark’s perspective on language use as a physical phenomenon is often cited. Yet, while the specific characteristics of language continue to be an ongoing discussion, Clark's perspective emphasises how language functions as a combined operation (Clark, 1996, pp. 59-91). There are various theories about what signs and symbols are, but according to Clark, we use signs to

signal because they illustrate, explain, imply and characterise. In short, a sign is considered meaningful only when it is directed to someone. A symbol, however, is not an entity per se, but an identification of a particular category of entities. For example, a word is a symbol essential to any concept it represents to an individual or a society as a whole (Clark, 1996, pp. 156-161). As shown, facial movements, speech tone, and overt or covert body language all play a significant role in the process of language comprehension. Crucially, the ALC model demonstrates that for a communication strategy to be effective, the speaker's intention must be deliberately conveyed and then appropriately acknowledged by the addressee (van Berkum, 2018, p. 653; van Berkum, 2019, p. 748).

5.3 Triggers and Parsing Established

In addition to unspoken signs, single words, phrases and sentences will evoke mental depictions from the addressee's memory. When discussing factors that can trigger an emotional event, the author refers to them as "emotionally competent stimuli" (ECSs), a common descriptor for any emotion-evoking trigger adopted from Damasio (Damasio, 2010, p. 78). While the ALC model draws on relevant insights and studies from pragmatics and emotion research, its grammatical focus is based on multimodal analysis of linguistic units. As such, the model depends on psycholinguistic theories of language analysis and refers to advanced linguistic frameworks including Jackendoff's Parallel Architecture (2007), Lakoff's (1987) approach to conceptualisation, and Filmore, Kay, and O'Connor's (1988) constructional proposal (van Berkum, 2018, p. 653; van Berkum, 2019, p. 748). Each offers a unique theoretical view of the complexity of language comprehension. However, the ALC model does not elaborate on these theories, and for inexperienced readers, Jackendoff's grammatical approach as well as mainstream generative grammar, can be challenging to understand thoroughly. Comprehending these theories is necessary to fully understand the design, interpretation, and conclusions of experimental studies on language and emotions. Therefore, a linguistic background is essential for the critical evaluation of such studies and their findings.

In essence, Jackendoff argues that syntax, semantics, and phonology are all fundamentally creative components of language. Each component has its well-formed rules and structures but they are intertwined and cooperative. In other words, language involves multiple interacting components operating simultaneously within a cognitively and phonetically limited system, and the interaction between them is how contextualised interpretation and meaning can arise (Jackendoff, 2002, p. 198). Lakoff highlights the human

ability and inclination to categorise everything we think, perceive through our senses, say and do. This ability is fundamental as it serves as the foundation of our lives, enabling us to function effectively both intellectually and physically. Our capacity for understanding, reasoning, and meaningful action relies on our necessary instinctive and unconscious ability to categorise. Importantly, categorisation extends beyond tangible objects to include abstract concepts and ideas. Therefore, categorisation shapes our understanding of the intangible across a wide spectrum, such as emotions, situations, relationships, scientific phenomena, and more (Lakoff, 1987, pp. 5-6). Filmore et al. show that the English idiomatic expression "let alone" can be used in a variety of ways due to the unique characteristics of grammatical patterns with different semantic and pragmatic functions. Their article illustrates that grammar is not limited to language per se as “let alone” can have different functions and limitations, and the construction of a complete grammar requires more than just a set of standard syntactic rules. Therefore, the construction of an exceptional phrase, the linguistic knowledge of the language user and the context in which the phrase is uttered influence the way it is analysed and interpreted (Filmore et al., 1988, p. 534). As already noted, any word retrieved from memory has the potential to evoke emotional responses and the way a word is conceptualised, interpreted and analysed is personal and context-dependent. Hence, emotional responses will influence emotional reactions (van Berkum, 2018, p. 655; van Berkum, 2019, pp. 748-749).

In the 2019 version of the model, the author identifies linguistic research that examines behaviour corresponding to emotion and evaluative words (see e.g. Foroni & Semin, 2009). Additionally, there is extensive research that shows a much wider range for anchoring word comprehension with emotional content, beyond the original findings (see e.g. Schacht et al., 2011). In both cases, readers must stay up-to-date with the findings, and the referenced research articles are quite extensive. In this context, certain words in the example sentences are revisited (“dog”, “euthanasia”). The reader’s interpretation of these words is influenced by past experiences, which in turn affects emotional responses when such words cross paths again. As with taboo words, emotional associations with certain words based on previous realities can leave a lasting impact on memory. The same applies to other types of words, phrases and prosody related to emotion and affect such as specific pitch patterns and word arrangements, and affective recollection markers are quickly activated when you meet the signs again. To illustrate, the author offers an example of such an arrangement: “*surely*, you know that…” (van Berkum, 2019, p. 750). Concerning provocative and hurtful expressions, he draws attention to Jay (2009) for further exploration of their nature and

reasons for their existence, and to Citron (2012) for a comprehensive review of brain activity during the processing of emotional written words. Other models of note include Barsalou's (2008) pioneering theory of grounded cognition and Pulvermüller's (2012) neuroscientific account of word meaning in the brain. Both focus on the connection between experiential skills and lexical semantics which represents a growing approach to understanding word meaning processing in the brain (van Berkum, 2019, p. 750). Examining these studies reveals the true complexity of the model, but the responsibility is on the reader to compare and interpret the findings for themselves. Key concepts, such as grounded language comprehension, emotion effects, motor resonance, and mirror neurons, are essential to the research and readers may wish to gain a good understanding of these basic elements. However, the ALC model remains consistent with existing findings as no contradictory results are presented. The following are summaries of some of the experimental studies mentioned in this chapter, to demonstrate that the appearance of emotion in language comprehension is almost immediate.

Existing research on embodied cognition and language comprehension suggests that the way we understand ourselves, others, and emotions, is guided by our ability to imitate movement patterns of faces and physical bodies. Foroni and Semin investigate the embodied nature of language and provide further evidence for the role of the body in language comprehension. Their experiments aimed to find out whether emotive expressions evoke facial muscle responses, specifically the smiling and frowning muscles. The research participants were exposed to linguistic expressions with positive and negative concrete verbs (e.g. smile, grin), and evaluative and affective state adjectives (e.g. happy, angry). Dutch students were recruited for 2 experiments, and in both experiments, EMG (electromyography) was used to estimate the relevant motor neurons. The first study was designed to investigate whether verbal cues activate similar facial muscles. The second study investigated the effects of unconscious verbal cues on social judgments by evaluating cartoons (humour) using the mirror neuron system. Taken together, the results provide evidence that action verbs contribute to affective appraisal while simultaneously evoking the corresponding facial muscles. During language comprehension, our ability to understand action verbs creates physiological imitations of the circumstances that need to be understood in the present moment. Therefore, facial and bodily simulations are necessary for affective language comprehension, and affective action verbs seem to impact our evaluations (Foroni & Semin, 2009, pp. 974-979).

Researchers have conducted several experiments over the years using a variety of approaches to address the question of how quickly emotion and affect can arise when people are exposed to linguistic stimuli. Schacht et al. cite previous studies that demonstrate the brain's ability to detect and process corresponding emotions within 200-400 milliseconds when presented with emotionally charged words, pictures, or faces. In some cases, this can occur even before 200 milliseconds. To test these findings further, they investigated the rapid occurrence of cognitive-emotional consequences in brain activity due to prior experience with positive reinforcement (i.e. operant conditioning). In their study, German speakers were exposed to unfamiliar Chinese words that were closely associated with negative, positive or neutral consequences a few days before the actual test. To facilitate memory integration, a period of time was allowed between the introductory session and the test. The study found that pairing unfamiliar Chinese words with positive reinforcement can produce what they refer to as Very Early Emotional Effects (VEEE) without awareness or meaning. In other words, offering participants a virtual financial reward for choosing a positive word improved their recognition of Chinese words in the subsequent task. At 150 milliseconds, VEEE was explicitly associated with stimuli that had positive consequences, while negative VEEE appeared at around 300 milliseconds (Schacht et al., 2011, pp. 130-133).

Furthermore, Pulvermüller notes that varied theoretical frameworks in linguistics have been criticised for relying on introspection while lacking empirical evidence to support their arguments. However, advances in neuroscience provide support for certain frameworks, including conceptual metaphor theory proposed by Lakoff & Johnson (1980) and grounded cognition proposed by Barsalou (2008). By examining the connection between meaning and action-oriented words in the brain, neuroscientific research shows that language is intimately linked to action. In particular, evidence from fMRI scans shows that regionally selective brain activity corresponds to the meanings of words. In other words, neurons responsible for processing action-related words are thought to be connected to neurons that control corresponding actions in the body. For example, words related to the arm find their corresponding motor circuits in the brain when you move your fingers. Thus, written and spoken language can evoke unique stimulations in the motor circuits that reflect specific elements of meaning in words and sentences. These stimulations are body-mapped and organised based on the body's motor system. They can potentially involve the processing of abstract concepts such as “freedom” (Pulvermüller 2012, pp. 423, 440).

In addition, neuroscience research confirms that words with high levels of arousal and strong emotional connotations correspond to neural brain activity involved in emotional and behavioural processing (i.e. the brain's limbic system). For example, words can activate parts of the brain responsible for scent and emotional structures. Scientists have discovered links between emotions, word meanings and neural networks. However, it remains unclear why emotional value arises and how the meanings of words are linked to internal emotional experiences such as a particular emotion. Thus, to link an emotion word (e.g. "pain") with the physical and mental experience of the corresponding emotion, it is necessary to have access to sophisticated behaviours that influence the use of the emotion word and the subjective experience of that particular emotion is required. Observational data generally support the idea that words related to specific emotions are closely linked to their associated actions, creating a semantic connection between them (Pulvermüller, 2012, pp. 435-436, 446).

5.4 Human Interaction and Speaker Meaning

The essence of language comprehension is understanding the speaker's communicative intentions in the present moment and context. It is not solely about recognising grammatical principles. The unspoken signs also aid the addressee in deciphering the speaker's intention. This interaction highlights the efficiency of human communication. Readers are encouraged to consult Clark (1996) for his approach to language use, and Levinson's exploration of human evolution. Levinson asserts that the ability to socialise through language lies at the heart of human social behaviour (Levinson, 2006, p. 39). Additionally, readers are invited to explore Sperber and Wilson's (1995) Relevance Theory, a model for understanding the meaning behind verbal expressions. Finally, it is worth exploring the perspectives of Scott-Phillips (2014) and Tomasello (2008) on language and evolution (van Berkum, 2018, p. 655; van Berkum, 2019, pp. 750-751).

5.4.1 Intention and Reference

The ALC model's core principle is the use of intentional communication strategies by the speaker to emotionally influence how the addressee understands the conveyed information. Several interpretive mechanisms are at play, and the author particularly highlights the work of Tomasello (2008). The first key component in the affective language comprehension process is to infer who or what the speaker is referring to. This situation has the potential for numerous emotional triggers to be retrieved from memory. The addressee constructs mental maps or representations of the referred situation, whether real or fictional. Following the

author's lead, Johnson-Laird (1983) and Zwaan (1999) provide complementary explanations of how we mentally immerse ourselves in imagined situations. Their accounts provide important data to consider, particularly when examining experimental research aimed at understanding the workings of the mind. Unfortunately, the ALC model lacks a detailed explanation of the complex processes involved in our ability to mentally simulate. Given the author's background as a cognitive neuroscientist, the criticism lies in the lack of sufficient guidance in the area of evaluation and simulation. These aspects deserve more attention in the discussion as our ability to emotionally evaluate and mentally simulate plays a crucial role in understanding the intentions behind verbal communication. After all, our ability to detect delusions or attempts at deception is vital for personal protection.

Furthermore, the model does not provide clear explanations of deixis, a well-established linguistic term (see e.g. Clark, 1996, p. 169). To enhance interdisciplinary collaboration, it would be beneficial to include a presentation and explanation of linguistic deixis, which could give the model a more linguistic perspective. Currently, readers are expected to independently research the relevant linguistic terminology. Given the critical role of reference in linguistics, the importance of affective deixis deserves an illustration. Drawing on the work of Robin Lakoff, Potts and Schwarz argue that certain demonstratives (this, that, those, and these) carry emotional content, although the nuances in meaning are not always immediately apparent. Affective deixis is an interesting linguistic-emotional phenomenon because it facilitates the sharing of emotions and fosters a sense of connection between the speaker and the addressee. For example, to give you an idea, when a speaker refers to a personally preferred object, such as a car, and claims: "Fast, this!", the utterance is typically intended to convey an emotional evaluation as certain names, people and objects are often referred to affectively. However, Potts and Schwartz argue that the situation is more complex. The addressee may have no knowledge about or interest in the reference, and attempts so share emotions or create bonds may fail without common ground (Potts & Schwarz, 2010, pp. 2-4). The author's examples of the practice of ending lives, including animals and prime numbers, are valuable for illustrative purposes. They effectively demonstrate the complexities of mental simulation and intended reference. Potts and Schwarz's approach to deixis highlights that names and personal perceptions of concepts, such as pets and active euthanasia, are linguistic units that can easily evoke emotions (van Berkum, 2018, p. 655; van Berkum, 2019, p. 751).

5.4.2 Intention and Attitudes

The speaker's attitudes are the second key component in the process of affective language comprehension, and the author places great importance on stance-taking. In every conversation, speakers implicitly or explicitly present attitudes that the addressee must discover to understand the intended meaning. Scholars classify attitudes into two broad categories based on the speaker's level of knowledge (epistemic stance-taking), and evaluation (affective stance-taking) directed toward someone or something (van Berkum, 2019, p. 751). The works of Du Bois (2007) and Hunston and Thompson (2003) are suggested to further clarify affective evaluation in stance-taking. As Du Bois highlights the importance of taking a stance with words, the author concludes that the speaker's emotional attitude will emotionally trigger the addressee. Evolutionary speaking, humans are adept at perceiving emotional signals from others and we possess empathy and moral responsibility (van Berkum, 2019, p. 751). In this regard, readers are encouraged to explore Decety and Cowell's work, which identifies empathy as a positive trait with interlinked cognitive (i.e., seeing through someone else's eyes), motivational (i.e., caring empathy) and emotional (i.e., emotional transfer/mirroring) elements. However, empathy also has some undesirable characteristics. Research on child behaviour has shown that empathy can be selective, meaning that we may not feel any moral responsibility toward individuals outside of our social circle. Therefore, Decety and Cowell suggest that more accurate definitions of empathy are necessary, as the association between empathy and moral responsibility is more complex than originally suspected (Decety & Cowell, 2014, pp. 337-339).

Furthermore, the author demonstrates the emotional impact of attitude on the addressee by revisiting his three example sentences. This illustrates how a speaker's contemptuous attitude can have a powerful effect on the addressee. A single utterance can evoke shame which is reinforced by unspoken cues such as emotional prosody. Equally important to emphasise is the potential impact of a speaker's constructive attitude, which can evoke pleasant emotional reactions in the addressee. Determining the specific nature of attitudes may be difficult, but identifying that someone has an attitude is more obvious. Identifying the true essence of attitudes involves both spoken and unspoken cues, such as wording, speech tone, body language, facial movements and silence. Unspoken cues can heavily influence how we interpret someone else's point of view. Essentially, attitudes expressed by others can have an emotional impact on us, consciously or unconsciously, regardless of how we interpret them. For a more comprehensive understanding of

collaboration including both empathic and aggressive aspects, and non-verbal information processing, delving deeper into the works of Levinson (2006) and Tomasello (2008) is recommended (van Berkum, 2019, p. 752).

Silence may be considered a linguistic phenomenon by some. However, it is important to note that the ALC model currently lacks an explanation for this. Therefore, a brief illustration may be helpful. Jaworski has dedicated an entire book to silence as a communicative tool. He demonstrates that silence serves functions with emotional value and often leads to vagueness when interpreting meaning. Silence can be categorised into two distinct extremes: Used as a means of asserting dominance or as a sign of obedience. A wordless communicator can switch between various emotional states without being able to identify them explicitly. These emotional states can include tolerance, (dis)agreement, hostility, or (dis)respect. Silence can also convey support or be used as a strategy to steer clear of retribution. However, interpreting silence and its underlying meaning is not always straightforward (Jaworski, 1993, pp. 67-69).

5.4.3 Intention, Cooperation and Motivation

The third key component is the complex interplay between intention, cooperation and motivation. The addressee must identify the speaker's motives for cooperation that underlies each utterance in a given situation. This cooperation concept is drawn from Tomasello's literature (Tomasello, 2008, p. 87), who proposes that three classifications of expressed motivations may have evolved as a linguistic *social* phenomenon. Essentially, the proposal is that the speaker's communicative strategies concentrate primarily on action, knowledge, or emotion:

- To make a request – manipulating or asking someone to feel, know, or do something to serve one's interest.

- To inform – to provide information in the belief that it will be helpful or interesting to the addressee.

- To share - to share information to evoke emotions and promote a shared emotional connection.

Interpreting communication strategies in social situations can be challenging due to the variety of emotional triggers that encompass the three components of affective language

comprehension mentioned above, including the addressee's anticipation. The author demonstrates in his four example sentences that each utterance holds the potential for multiple interpretations due to the relational motives behind them. A single utterance can be interpreted, for example, as an attempt to persuade, support, amuse, impress, or insult. This can result in misunderstandings if the addressee misinterprets the underlying intention. Undoubtedly, language use can evoke emotions in our interactions leading to critical evaluation of what is considered good or bad. In the context of interpersonal relations, the model lacks consideration of relevant linguistic issues within interpersonal pragmatics and the impact of society on language users, as explored by sociolinguistics. However, to adequately cover the issues addressed in this chapter, it may be sufficient to reference Tomasello (2008), Jay (2009) and Irvine (2013). Regarding reciprocity, the emphasis is on the speaker's crucial task of capturing the addressee's attention through the skilful use of selected spoken and unspoken resources. Thus, the speaker's ultimate goal is twofold: To satisfy the need for cooperation and to effectively deliver the request or information, or make an emotional connection. Notably, this does not require the addressee's willingness to cooperate (van Berkum, 2018, p. 656; van Berkum, 2019, pp. 752-753). Despite clear indications, the model could have been clearer in explaining the relationship between language use and human needs. Effective communication is essential for fulfilling emotional, physical, and psychological needs.

5.4.4 Complementary Meaning and Affective States

The embedding of one emotionally capable trigger within another is a common aspect of human communication. This social phenomenon can manifest itself in different ways, including face-to-face conversations or when readers engage with fictional worlds. In this chapter, an example of such social intention is provided where an utterance can be interpreted as both intentionally offensive and humorous: "You are really ugly!" (van Berkum, 2019, p. 754). In this way, similar to artistic creation, we experiment with established verbal traditions to add more depth to meaning. We interpret meanings that speakers never intended to communicate about themselves, which are complementary but separate from the speaker's intended message. The author exemplifies how complementary meanings can relate to how we perceive being treated disrespectfully, or why we do not understand how others can be verbally abusive (van Berkum, 2018, pp. 656-657; van Berkum, 2019, pp. 754-755).

Despite their importance, significant linguistic phenomena like Grice's notion of conversational implicatures are mentioned but not adequately explained. Contemporary

emotive linguistic phenomena, such as pragmatic emotive implicatures, are also not explored. Against this background, Schwarz-Friesel argues that “To get to those conversational implicatures, however, one has to draw the e-implicature” (Schwarz-Friesel, 2015, p. 168). Implicit utterances not only include requests and commands but also convey the speaker’s emotional states, enabling the addressee to infer emotional needs such as the need to grieve or be inspired. This aligns with Tomasello's sharing motive but Schwarz-Friesel’s main emphasis is on indirect speech, revealing the implied meanings that go beyond a speaker’s literal words (Clark, 1996, p. 137; Tomasello, 2008, p. 87; Schwarz-Friesel, 2015, p. 168). The main objective of this critique is to demonstrate that an explanation of the concept of implicatures could significantly enhance our understanding of the intricate nature of implied meaning in human communication.

The author discusses the emotional impact of storytelling on behaviour, language, stance, values, and sense of identity. However, the ALC model does not encompass the historical, philosophical, narratological, and linguistic complexities of stories. Instead, the reader is referred to Slater et al. for an exploration of why we find them entertaining, with a particular focus on the narrower self (Slater et al., 2014, p. 442). Furthermore, it is noted that similar to real-life situations, fictional communicative strategies are influenced by the emotional attitudes of the narrator. This provides an interesting approach to resolving the story, which can then be manipulated for experimental research. Regarding the author’s experimental studies, he suggests that the model can assist neurolinguistics in evaluating the interaction between language and emotion throughout during research and interpreting the findings. Most importantly, the model clearly shows that at every stage of language comprehension, emotion is *integrated* (van Berkum, 2018, p. 658; van Berkum, 2019, p. 755).

Although the model does not delve into the interplay of emotion and linguistics in fiction, we can see that research on narrative might not have much relevance if we do not have a good understanding of our emotional relationship with storytelling. That is to say, strengthening the model’s arguments about our ability to mentally place ourselves in fictional worlds by seeking theoretical support from relevant fields could yield helpful results. For example, affective narratology and literary linguistics are broad sub-disciplines within their respective fields. According to Hogan (2011), emotions play a significant role in storytelling, as they create plot twists that arouse readers’ curiosity. Moreover, Fabb (1997) provides valuable insights into the use of linguistic structures in various cultures and literary genres. Despite the different perspectives of these scholars, they share a universal appreciation for

verbal and written storytelling. Slater et al. emphasise the need to mentally escape from our identities and community roles, which can be fulfilled through fiction (Slater et al., 2014, p. 451). Therefore, this critical approach aims to demonstrate how different perspectives can mutually reinforce each other.

Irrespective of a speaker's words and intentions, the ALC model seeks to demonstrate that underlying moods and temporary emotions play a significant role in shaping the interpretation of utterances (van Berkum, 2019, p. 754). This idea is supported by research conducted by Vissers et al. who found that mood is related to language comprehension mechanisms by testing the processing of grammatical irregularities (Vissers et al., 2010, p. 3521). However, van Berkum et al. found that grammatical irregularities were not affected by mood, but instead strongly influenced the prediction of the next talked-about person (van Berkum et al., 2013, p. 16). Reference is also made to Federmeier et al. who researched to see if temporary mood evokes stored information during language processing. They found that mood had a notable impact on brain activity intimately linked to retrieving and incorporating linguistic information from memory (Federmeier et al., 2001, p. 152).

Returning to the example sentence in the 2018 version of the model, possible locations of emotional triggers and emotions may emerge in the addressee in response to an utterance such as "You are a real bitch!" (van Berkum, 2018, p. 658). The chapter presents additional examples that illustrate how the varying intentions behind utterances can lead to specific emotional effects. It serves as a summary of the model, reinforcing the main argument that language and emotion are closely linked. In this context, the author refers to his research (Struiksma et al, 2017; not found available) which proposes that the use of improper language, such as curse words, has the potential to evoke adverse emotions in the addressee. This is due to the emotional aspects inherent in the meaning of each singular sign (van Berkum, 2018, pp. 658-661).

The author suggests that affective language theory can be a valuable tool for exploring various emotionally expressive indicators. As such, the ALC model is useful for analysing emotionally charged intentions (examples from van Berkum):

- Verbal or textual discourse
- Informative texts
- Emoji analysis
- Concurrent body language

- Orthographic mistakes in schoolwork
- Fictional worlds and narrative conversations

In this context, readers are encouraged to recognise language that may initially appear to have muted emotional undertones (van Berkum, 2018, p. 661). The work of Lai et al. is cited, which examines implicit emotional cues embedded in sentence structure. Their findings reinforce the idea that the meaning of a sentence exceeds the connection of mere lexical constituents. There seems to be a complex relationship between two unique neural networks: One for compositional language processing and the other for emotions (Lai et al., 2015, pp. 1528, 1538-1539). Furthermore, the author recommends using the model with topics such as ethical orientation and the notion of framing, the latter being a concept related to charismatic influence on political intentions. Readers are therefore guided to explore the contributions of Corner and Clarke (2017) who investigate stance-taking and climate change, and Scheufele and Iyengar (2012) who investigate the intersection of politics and communication. As such, the model has versatile potential for usage across disciplines (van Berkum, 2018, p. 661). On the one hand, the potential benefits of using the ALC model in service of the public interest in other disciplines may remain somewhat unclear. It is important to avoid using the model in a harmful way, and drawing attention to politics and communication could have negative implications when using it as a tool for advancing political agendas. On the other hand, readers may benefit from acquainting themselves with the concept of political framing to understand its true nature, and explore how the model can assist in understanding the linguistic techniques employed in hidden politics and media agendas.

In addressing word valence, the ALC model emphasises the robust link between the various emotional triggers such as spoken and unspoken signs, inherent human intentions, memory retrieval and context. Importantly, the model highlights that emotions are evoked remarkably early in the language comprehension process even *before the addressee has figured out the speaker's intention* (see Figure 28.3, van Berkum, 2018, p. 663). Regarding neural activity, the author cites Citron et al. as evidence that affect influences the processing of emotional words during reading (Citron et al, 2014, p. 88). However, determining the emotional valence of words is difficult due to their inherently personal nature. In this situation, the ALC model can help by demonstrating how signs of all kinds can evoke emotional valence, with or without awareness. As such, the brain is sensitive to emotional content, regardless of societal definitions of the meaning of words (van Berkum, 2010, pp. 183, 196-197; van Berkum, 2018, pp. 662-663).

5.5 Experimental Studies

To demonstrate the usefulness of the model, four EEG experiments are presented:

- **Processing insulting language**

The first EEG study examines the processing of insults, including curse words. Researchers investigated the impact of insulting language by having research participants read personal sentences containing either another person's or their own first name, with and without vulgar curse words and praise. Irrespective of the target of the insulting remark, they found that speech containing a vulgar curse word elicits a P200 occurrence at 150-200 milliseconds after the word onset. Therefore, they suggest that emotional triggers, such as vulgar curse words, produce a neural reflex at the microscopic scale rather than at the inferential level of speaker intention. In the same study, they found that vulgar curse words elicited a Late Positive Potential (LPP) occurrence at 350-500 milliseconds, regardless of the target of the insult. This is likewise expected to be a dissociation from the speaker's intention. Given these findings, they concluded that no definite conclusion could be drawn. The ALC model can be a guide to the origins of emotional responses to vulgar language, the author suggests (van Berkum, 2019, pp. 755-756).

- **Processing implicit verbal responses to protect one's weaknesses**

The second EEG study analyses how the brain interprets implicit verbal responses that protect one's weaknesses. The study draws on Grice's concept of implicature, emphasising our inherent ability and willingness to interpret utterances that carry both strong and weak implicatures. In this context, Bašnáková and colleagues simulated a work application scenario in two different ways with the same participants. In the first session, participants were assigned the role of a job recruiter and had to interview three applicants by asking questions about their life stories, practical knowledge and skill sets. Naturally, the questions were deliberately worded to provoke both explicit and implicit verbal responses. During the second session, participants took on the role of listeners while others acted as recruiters. They were able to hear both the pre-arranged questions and the explicit and implicit answers. Finally, the participants had to select the most qualified applicant for each position. The researchers observed that every part of the brain was activated during the process of comprehending implicit verbal responses. Most importantly, they were able to see that the verbal responses protecting one's weaknesses (i.e., inoffensive implicit excuse) amplified in regions actively engaged in affect *only* when the participants were spoken to, a discovery that had not been

possible without a full brain wave test (Bašnáková et al., 2015, pp. 79-80, 87-90; van Berkum, 2019, pp. 756-757).

The study confirms that the brain is constantly working to find out the true intentions behind explicit and implicit utterances. This is important as we quickly assess other people's attitudes toward us and consider potential candidates or employers. The ALC model predicts that emotional connection with other people's attitudes is a necessary part of the language comprehension process. Therefore, understanding the speaker's intended meaning requires the ability to anticipate their references, attitudes and motivations behind the spoken word (van Berkum, 2019, pp. 756-757). As a final point, the ALC model does not explicitly discuss the concepts of explicatures and implicatures in face-to-face conversations. However, the reader is encouraged to explore these interesting phenomena independently.

- **Processing fiction dealing with unethical and ethical behaviour**

The EEG studies conducted by 't Hart et al. (2018, 2019), have undergone editorial review, resulting in slight changes to their titles. Having said that, the researchers analysed the following sentences in the context of a fictional world where the main character displayed either ethically positive or negative behaviour: "Mark was furious when…", and "Mark was happy when…" (van Berkum, 2019, p. 757). The EEG results confirm that the frowning muscle corresponds to emotionally evoked responses when the participants read fiction, but does not follow their emotional positivity or negativity (i.e., valence). More specifically, the participants showed a more marked frowning reaction when reading the morally negative sentence. They visibly created a simulation and evaluation of the sentences presented, revealing contrasting emotions when confronted with protagonists with questionable and ethical characteristics. Their findings also confirm the mind-body connection in embodied language interpretation (van Berkum, 2019, pp. 757-758; 't Hart et al., 2018, p. 1).

The ALC model can be of assistance in clarifying the emotional experiences of readers as they engage in simulation and evaluation. Adjectives such as "furious" are likely to trigger feelings of anger due to their inherent meaning, and simultaneously influence the reader's mental simulation of the fictional story. The reader's standards and principles are expected to be invoked through the evaluation of the emotionally elicited situation presented in the scenario. However, the writer's intentions or perspectives are unlikely to serve as emotional triggers in the current story about the character Mark. Other types of texts or talks may trigger emotions due to the writer's personal opinions and experiences being more noticeable, such as

in online journals. The ALC model can also identify the sources of emotion when we listen to or read fiction (van Berkum, 2019, pp. 757-758).

- **The influence of mood**

The final EEG study focuses on mood as a stimulus for regulating information processing. Van Berkum and his team cite extensive research confirming that a negative mood can lead to a narrowed focus of attention, and predict that mood changes must also play a role in language processing. Their findings suggest that mood influences the anticipation of prejudice. Participants who were manipulated into a negative mood were unable to predict the identity of the next person to be discussed when they read texts containing implicit causality verbs; when reading the sentence "David praised Linda because…" the subsequent content would not centre around David, but Linda (van Berkum et al., 2013, p. 1). The writer's reference to "David" appears to be minimised due to a negative mood. This shows that mood affects the prediction of referents and therefore language comprehension, but not grammatical analysis (van Berkum, 2019, p. 758).

5.6 Summary

The ALC model focuses on the processing of communicative actions and acknowledges the influence of emotions on communication. It proposes key components of the speaker's communication strategies and encourages the addressee to infer these components during a direct verbal exchange. The crucial components are identifying and analysing the speaker's spoken and unspoken signs, determining references, and working out the speaker's intentions, attitudes, motivation, and complementary layers of meaning. The model highlights the significance of efficient communication in conveying human needs and the function of emotion and affect in language comprehension. It can help psycholinguistic and neurolinguistic research in identifying emotional factors that impact language processing and comprehension, and encourages collaboration across disciplines.

A common criticism is that readers must be familiar with advanced scientific theories to fully comprehend the model's fundamental arguments and research. This is important because there are issues that require further investigation. For example, Jackendoff's grammatical approach may be relevant. Investigating emotional phenomena can deepen the understanding of the relationship between language and emotion such as emotion deficit, which is not addressed at all. The author notes that we use language to discuss personal matters. As such, emotions introduce diversity in language processing and comprehension,

which should be acknowledged. The model also encompasses writing, demonstrating a comprehensive approach to understanding the complex interaction between language and emotion. Ultimately, from this perspective, emotion is integrated into all aspects of the language comprehension process, as *any* accessed or created representation can serve as an emotional trigger (van Berkum, 2019, pp. 759-761).

6 The *facial* Affective Language Comprehension Model: A Brief Review

6.1 Introduction

Van Berkum et al. (2023) have proposed a new design for the ALC model, known as the *facial* ALC model (the *f*ALC model). The *f*ALC model aims to detect and anticipate facial muscle activity during language comprehension, using facial EMG. This model is also based on relevant concepts from psycholinguistics and pragmatics, including the work of Jackendoff (2007) and Tomasello (2008). The authors present what they deem necessary to understand the impact of language on the movement of facial muscles. The *f*ALC framework proposes an additional process that involves interdependent mental activities including emotional simulation, evaluation and imitation, as well as other complementary factors. This brief review aims to outline the main differences between the two models.

6.2 Various Levels of Language Comprehension

As outlined in the ALC model, verbal expressions in casual communication require significant processing by the brain. The *f*ALC model provides a brief summary of the key components of the ALC model which are involved in the process of language comprehension. The sentence "Mark is angry" (van Berkum et al., 2023, p. 715) illustrates different levels of affective language comprehension. The interpretation process is described as follows:

1) The surface linguistic expression: When identifying and analysing an utterance about someone named Mark who is experiencing anger, past experiences evoked from memory and other contextual cues will determine how the addressee interprets and understands each linguistic unit that makes up the sentence. 2) Mental simulation of the scenario: In simulating the person being referred to, the addressee must identify who is angry while visualising the physical manifestation of anger. The addressee's mental model of the situation, while listening to the speaker, is likely to include more than just the three linguistic units. It may also include additional information that was previously provided or assumed. Therefore, the *f*ALC model is concerned with mental visualisation of situations described in Zwaan's (1999) situation

model. 3) The emotional and personal attitude: The addressee should interpret the speaker's attitudes as they provide crucial information about the speaker. An individual's attitudes can be conveyed not only through spoken or written words but also through non-verbal cues such as intonation, facial micro-expressions, gestures, textual symbols in writing, or response time (van Berkum et al., 2023, pp. 715-716).

When interpreting the speaker's intention and motivation for Mark's anger, the addressee must figure out whether it is a request or information and why it is being shared. For example, Mark may be expressing anger indicating a need for an apology. Alternatively, Mark may be directing his anger toward someone who wants to share the emotional discomfort of being on the receiving end of someone's anger. Different intentions and motivations can thus underlie an utterance or any written text. In this case, the authors cite the work of Tomasello (2008). As a final step, the addressee will interpret complementary meaning that may not have been intended by the speaker, based on the entire interpretation process. For example, in stating that Mark is angry, the words may portray a person whose perspective and behaviour are influenced by his profession, rather than someone upset with those involved in the conversation. The addressee may misinterpret Mark's emotions, or other non-verbal cues may provide insight into the speaker's intentions (van Berkum et al., 2023, pp. 715-716).

6.3 Evaluation Based on Emotions

Van Berkum and colleagues argue that language comprehension involves representations such as signs, mental simulations and attitudes, that can become emotional triggers deemed relevant for the interpreter. The interpreting process can unfold in terms of evaluation based on emotions:

Linguistically, a personal name can evoke different emotions independent of the current situation due to previous experiences with that particular name. When mentally simulating a scenario, a personal name linked to an angry individual can evoke different emotions due to the personal connection. The speaker's emotional and personal attitude can also evoke different emotions depending on how their emotions and attitudes are conveyed and thus interpreted through the presentation of non-verbal cues. For example, a contemptuous intonation accompanying the utterance can influence the addressee's response. The model highlights that responding emotionally to an utterance can be detected through facial expressions, as indicated by the activation of the smiling and frowning muscles. Unlike the

ALC model, this framework considers the impact of language fluency on emotions and language comprehension. For example, academic texts with unfamiliar and advanced terminology can trigger negative emotions if the brain struggles to process the information (van Berkum et al., 2023, pp. 716-717).

6.4 Emotion as a Form of Mental Simulation

As noted, emotions can serve as evaluative tools in the interpretive process that links language and emotion. However, language also relies on emotive phrases and states, leading to the activation of the brain's emotional systems in the process. The reader is referred to studies on the interaction between the brain's motor systems and language comprehension, such as the work of Barsalou (2008), Glenberg (2017), Havas and Matheson (2013), Winkielman et al. (2018), Zwaan (2014, 2016), Pulvermüller et al. (2005), and Willems and Casasanto (2011). In brief, these researchers examine whether embodied cognition (involving sensorimotor activation) plays a vital role in language comprehension. For example, Willems and Casasanto argue that during language comprehension, sensorimotor areas of the brain are activated during the overlap between action verbs (e.g. kick) and comprehension, a situation that is highly context-dependent (Willems & Casasanto, 2011, p. 1). In this regard, a reference is made to the work of Foroni and Semin (2009, 2013) and Fino et al. (2019), who argue that the smiling and the frowning muscles interpret emotion words (e.g. angry, smile) as emotional simulations rather than emotional evaluations (van Berkum et al., 2023, pp. 717-718). To gain a comprehensive understanding of embodied affective language comprehension, readers should examine theoretical frameworks and experimental studies in this field.

Under these conditions, the authors clarify that emotion as a form of mental simulation occurs when we use our emotional system to create mental images of emotions or their characteristics. In language comprehension, emotion simulation can occur in several ways. For example, when reading about someone experiencing anger, a simulation of anger may occur through the individual's understanding of the emotion word, which is manifested as a micro-expression through the activation of the frowning muscle. The frowning muscle can also be activated when a person is imagined to be angry by creating a simulation model of an actual conversation about someone in a state of anger. Additionally, a speaker's personal views can influence the addressee to simulate an attitude. Emotional language and distinctive writing styles can convey an author's strong opinions, leading the reader to visualise the underlying emotional expressions such as facial movements and intonation. Significantly, the emphasis is on the significant difference between emotional simulation and evaluation

referring to the concept of schadenfreude (i.e. the pleasure felt when someone is hurt). That is to say, the emotional evaluation of the speaker's misfortune is based on one's ethical foundation while experiencing pleasure from it. Figure 4 on page 714 illustrates that emotional evaluation is based on personal values and experiences. Emotional simulation is the ability to mentally visualise the speaker's situation, and both methods activate facial muscles. Readers are referred to Cikara and Fiske (2012) for a comprehensive approach to schadenfreude and its relationship to envy (van Berkum et al., 2023, pp. 717-718).

6.5 Emotional Mirroring and Additional Influences

The model suggests that individuals mirror the facial movements and emotional displays of others through imagination when they cannot be observed. By forming a mental image of someone in an emotional state, we can imitate their emotional facial movements when we think about them or hear them speak. Similarly, we can prompt our viewers to imitate our facial movements. The authors cite studies conducted by Hess and Fischer (2014) and Hatfield et al. (2014) as scientific evidence for emotional imitation and contagion. They recommend examining van Boxtel's (2023) research, which uses facial EMG to monitor emotional responses to facial movements. The fact is that we unconsciously imitate the emotional displays of others as they unfold (perception) and visualise situations (imagination) due to the functions of our visual system. To understand how individuals unconsciously imitate the smiles or frowns of others, the authors refer to Albers et al. (2013) and Dijkstra et al. (2019). These studies investigate the brain's neural overlap between perception, imagination and memory. The authors suggest that to understand language, we mentally construct facial expressions and inevitably imitate them. Although the hypothesis is not testable, they include imitation in their model due to its potential to linguistically influence facial electromyography activity (van Berkum et al., 2023, pp. 718-719). To explore the neuroscience that supports their assumption, the authors refer to the work of Fino et al. who found that when reading texts that convey whether a particular circle of politicians is smiling or frowning, readers show higher "emotionally congruent facial responses" (Fino et al., 2019, pp. 1, 7). In other words, readers' facial expressions reveal which politicians they prefer when reading about their emotions.

Finally, the authors suggest that interpreting unemotional and emotional facial muscle activity can be confusing. They draw attention to experimental studies that have investigated how to discriminate between the two types of facial muscle activity using facial EMG. For example, Elkins-Brown et al. argue that when we receive consequences for a mistake, the

negative activity of the frowning muscle increases (Elkins-Brown et al., 2016, pp. 159, 167-168). In this case, they question whether the activation of the frowning muscle is emotional or an indication of a conscious attempt to produce a result. Nevertheless, as many facial expressions are not emotional, this fact should be included in the model (van Berkum et al., 2023, pp. 718-719).

6.6 How to Put the Model into Action?

After analysing experimental studies that use facial EMG to investigate affective language comprehension, the authors advise that the *f*ALC model may provide new insights. The main argument is that there are multiple explanations for why language can be evoked by facial muscle activity. They make a clear distinction between evaluation and imitation and explore how facial imitation caused by perceptual visualisation may differ from the kind of simulation used in language to create mental images. Furthermore, the model proposes potential options for evaluation and simulation activated by language that could be useful for future research. With this in mind, the scientific evidence supporting the suggestion of potential options is quite extensive. The reader is required to update themselves on the findings. Due to the limited length of this brief review, and the fact that the model is newly formulated and may not be widely accepted, potential options for implementing the model will not be explored. Nevertheless, the authors provide an overview of what they see as potential barriers and opportunities (van Berkum et al., 2023, pp. 719-721).

6.7 Summary

The main aim of the *f*ALC model is to identify and anticipate facial movements, arguing that there are various explanations for why language can trigger facial muscle activity. The model utilises the fundamental elements of affective language comprehension as described in the ALC model. Additionally, it suggests an integrative mental process that involves emotional simulation, evaluation and imitation, as well as other complementary factors. The latter includes the potential for confusion in interpreting unemotional and emotional facial muscle activity. Our visual system functions involuntarily, as evidenced by scientific research, in imitating other people's emotional displays as they unfold (perception) and in visualising situations (imagination). The *f*ALC model can assist research by providing new insights into the role of facial muscle activity in affective language comprehension. However, a major obstacle to the use of facial electromyography is the assessment and identification of individual emotions. In essence, the *f*ALC model demonstrates how facial EMG can track

how the addressee simulates the speaker's communicative strategy based on emotional evaluation.

7 Neuropsychology and Emotion Deficit: Alexithymia

There is a substantial amount of literature on alexithymia, and this discussion only provides a brief overview of the research conducted on this condition. The purpose of this Section is to highlight individual differences and examine whether emotion deficits can impact language comprehension. In other words, the question is to which extent emotional competence is important for understanding language.

7.1 What is Alexithymia?

Previous focus on universal patterns in emotion theories has obscured the cognitive-emotional processes essential to individual variation. Modern evidence, however, recognises that responding emotionally can be attributed to outcomes of personality traits and life stories, the manageability of situations and temporal factors such as shifts in individuality and circumstances. Mapping how individuals with alexithymia manage emotions is thus relevant. To understand how information is processed, it may be beneficial to consider individual variations in both neutral and emotional stimuli to understand cognitive activity (Luminet et al., 2021, p. 436). Alexithymia was originally discovered in people with psychosomatic illnesses, post-traumatic stress disorder (PTSD), eating disorders and substance abuse. These patients focused on external stimuli and struggled to recognise and express emotions. They had problems distinguishing between emotions and physical sensations and showed limited ability to dream and affectively visualise. Alexithymia also involves emotional reactions that affect posture, facial expression, prosody, the autonomic nervous system and self-consciousness. Within these mechanisms, the condition affects emotion regulation, which can lead to functional or dysfunctional outcomes (Taylor, 2000, pp. 134-135). The term "alexithymia" was coined by Sifneos (1972, 1973) and means the absence of vocabulary to communicate emotions. Since then, developments in the field of psychoanalysis have moved away from the idea that alexithymia is based on defence and conflict strategies, but rather a state of deficiency. This recognition of alexithymia has highlighted the link between affective responsiveness and physical illness. In addition, the emphasis on developmental deficits has shed light on more complex mental illnesses such as personality disorders. However, according to Lane and colleagues, finding the right label for alexithymia has been a challenge

because the condition is more complex than just a lack of emotion words (Lane et al., 2015, p. 595).

Research has shown that alexithymics can be overly emotional. Thus, alexithymia cannot be attributed solely to emotion-processing deficits as there is a lack of evidence to support this argument in situations where subtle emotional responses occur. To deepen the understanding of the processing of emotions, subtlety and detachment in emotional responses and reactions need to be clarified. The study of alexithymia, therefore, serves two purposes: A general assessment for medical reasons, and a detailed analysis of individual differences through fine-grained scoring. Over the last quarter of a century, modern research methods have improved our understanding of how certain disabilities may be related to alexithymia. For example, research has shown that when tasks become more difficult, for example under short time intervals, individuals with high levels of alexithymia may struggle to process emotions. Other research suggests that a tendency to focus on the external environment is essential to emotion deficits, while problems with identifying and expressing emotions indicate a need to overreact (Luminet et al., 2021, pp. 436-438).

Furthermore, some researchers suggest that when emotional self-regulation does not function properly, it can cause problems such as difficulty adapting to stimuli, chronic tension, difficulty calming down and ineffective responses, which can lead to serious illness. In addition, lack of attention associated with alexithymia may show similarities to disturbances in the predictive and reactive phases, and in the prediction of emotion processing. Researchers have found that intense emotions such as fear and anger are seen as calmer, while calmer emotions such as sadness are seen as more excessive by people with extreme alexithymia. Thus, alexithymics higher on the spectrum have difficulty discerning between the intensity of affect and temperament (Luminet et al., 2021, p. 439).

Building on Freud's idea of agnosia, Lane et al. propose a new approach to alexithymia; "affective agnosia". In principle, the human condition of agnosia involves the ability to sense an object without being able to identify or understand the meaning of it. In other words, sensing the stimulus but failing to visualise it and consequently failing to express it. As matters stand, in contrast to research on visual response, there is no factual method of measuring how accurately people consciously understand and respond to their emotions. However, despite previous assumptions, scientific investigation is still possible in the study of consciousness and the treatment of psychiatric disorders. In affective agnosia, the interaction between the observer and what is perceived or understood leads to a change in what is known

through the process of visualisation, which is in contrast to agnosia. That is, the emotional response is generated subcortically and thus *has the potential to be perceived* but not expressed. In these circumstances, affective agnosia is generally thought to be caused by a developmental problem rather than a brain injury and is a condition of not being able to experience how one feels. In essence, children's ability to identify their emotions often depends on their carers' ability to affectively empathise with them and help them to visualise their inner state (Lane et al., 2015, pp. 598-601).

On the subject of conceptualisation, there has been criticism of the need to expand the concept of alexithymia beyond its original meaning. Taylor et al. emphasise that there is more to the concept of alexithymia, pushing back against the suggestion of affective agnosia. While alexithymia technically refers to a specific type of anomia (i.e., the ability to visualise but not express), its original definition encompasses a wider range of experiences. The word *alexithymia* is derived from Greek: *a*; lack, *lexis*; word, *thymos*; mood, emotion or feeling, and was originally proposed because of the challenge of finding the right term for the inability to express one's emotions. As mentioned earlier, early clinical research found that patients with traditional psychosomatic illnesses often had considerable difficulty in articulating their emotions. They also showed little evidence of engaging in introspective or imaginative thought processes, focusing more on narrating environmental situations with detailed precision. As shown, the concept of alexithymia has a wide range of observable characteristics and has been offered other explanatory markers. Despite the tendency to explicitly apply alexithymia to a single aspect, it seems to be widely accepted around the world (Taylor et al., 2016, pp. 1008-1009).

7.2 Measuring Alexithymia

There are several ways of measuring alexithymia, each of which has its advantages and disadvantages. These methods include self-reporting, observation, interviews, and tests of emotional intelligence and awareness. The most widely accepted self-report measure is the 20-item Toronto Alexithymia Scale (TAS-20) by Bagby et al. (1994a, 1994b), which is the main point of interest. The TAS-20 is structured as a component analysis that captures three specific elements of alexithymia in which individuals rate their level of the condition:

- Whether feelings are difficult to recognise
- Whether feelings are difficult to explain
- Whether thinking is external or internal

Therefore, individuals need to assess their affective abilities and identify their mindsets. Researchers have therefore questioned whether self-evaluation is sufficient to identify alexithymic individuals. Because knowledge is derived from conceptual memory retrieval, self-evaluation of personal characteristics is generally incomplete. The self-report method is based on a person's views according to available active memories. Alexithymics must therefore be aware that they have problems in characterising their emotions. Consequently, whether alexithymics score high or low on the TAS-20 depends on their degree of emotional detachment, their belief in emotional competence and their confidence in their abilities. Thus, the components of the analysis may not test correctly as people have different degrees of emotional maturity and experiences. Another criticism is that tests for alexithymia often include typical participants. Accurate documentation of alexithymia is therefore challenging for a number of reasons as there are other critical factors at play, which are beyond the scope of this brief discussion (Lane et al., 2015, pp. 596-597; Lundh et al., 2002, pp. 362-363). Nevertheless, the authors of TAS-20 acknowledge that the questionnaire alone may not be sufficient to measure alexithymia, especially in the case of extreme alexithymia due to the unawareness of their condition. Yet, they contend that TAS-20 is a reliable measuring device (Taylor et al., 2016, pp. 1011-1012)**.**

7.3 Empathy and Simulation in Alexithymia

Bird and Vinding suggest that the processing of empathy is affected by the emotion deficit in alexithymia due to an impairment in the mental representation of affect. There appears to be congruence between the alexithymia construct and the defective affect representation as alexithymics do not know which emotions they are experiencing, although they are aware of having them. Therefore, alexithymics do not seem to have a mental simulation of the emotional state they are in. As a result, inner emotive states cannot be associated with sensory cues similar to the emotive states of other people due to an absence of separate emotive states within oneself. Research suggests a connection between alexithymia and activity in the anterior insula. The degree of alexithymia and activity in the anterior insula has also been linked to empathy. This suggests similarities in the links between insula activity, empathy and alexithymia in both healthy adults and autistic individuals. Another study looked at the activity of the empathic brain when evaluating another person’s pain in relation to one’s own experience of pain. The study found that the level of alexithymia determined the level of empathic brain activity in individuals with and without autism. There was no evidence of reduced empathic brain responsiveness associated with autism. The studies reviewed by Bird

and Viding indicate that individuals with alexithymia exhibit reduced levels of empathy. Importantly, these reduced levels of empathy cannot be attributed to perceptual biases, as the observed empathic responses were unrelated to accurately understanding (i.e. based on theoretical cues) the emotional indicators presented by others (Bird & Viding, 2014, pp. 528-529).

7.4 Affective Language Comprehension in Alexithymia

According to grounded cognition theories (Barsalou, 1999, 2008), the mind and body interact to make sense of linguistic symbols. Together, the classification of emotions is seen as a result of experience, guided by our body's understanding of emotions and influenced by language use (Barrett, 2006). That is, the use of emotive language is the imagination or partial activation of emotive states based on affective experience. Measuring the frequency of emotional words has been at the heart of research into the language of people with alexithymia. For example, research has shown that psychoneurotic subjects tend to have a larger affective lexicon than psychosomatic subjects. No relationship was observed between the affective lexicon rating and either alexithymia or other personality measures. Another study analysing affective adjectives assessed verbal responsiveness to emotive imagery and found that high raters on the TAS-20 used fewer emotional terms than the low raters. Additionally, researchers analysed the use of emotional language during the depiction of film segments that induced high levels of emotion in the participants. The results show no significant association between the number of emotion words used and the overall scores on another alexithymia measure device; the Bermond-Vorst Alexithymia Questionnaire (BVAQ) (Wotschack & Klann-Delius, 2013, pp. 514-515).

Other researchers have examined the linguistic and non-linguistic cues used during storytelling by people with high and low levels of alexithymia. Despite being recommended by the TAS-20, they found no clear relationship between their ratings of linguistic expressivity and any aspect of alexithymia. A crucial omission is that the latter study does not specify which sentences were considered emotional and for what reason. Ultimately, the research presents inconsistent findings regarding affective language comprehension in alexithymia. These discrepancies may be due to differences in research methods, including the categorisation of emotion words, the relevant syntactic categories used, the distinction between relative and absolute occurrence, and the definition of emotional expression. In addition, the inconsistent findings may also be due to sampling, with potential differences between young and old participants and between healthy subjects versus inpatients

(Wotschack & Klann-Delius, 2013, pp. 514-515). In particular, methods such as sentence formation abilities and recognition of words have been used to study how people with severe alexithymia understand affective language. The former requires conscious attention and reasoning as it is a high-level processing task, while the latter does not require such attention as it is a simple processing task. Research on high-level processing of emotional stimuli appears to be more conclusive than that on simple processing; alexithymia is negatively related to the ability to match or remember. However, research on simple processing does not show an explicit lack of understanding of emotional language in individuals with alexithymia (Welding & Samur, 2018, pp. 8-13).

7.5 Summary

There are different ways of developing alexithymia with people falling on a spectrum of emotional deficiency. Researchers believe that people with alexithymia have a reduced capacity for affective imagination, which seems to coincide with empathy and the inability to perceive how they and others experience emotions. Research methods such as self-report measures are often criticised because it can be problematic to ask people to rate themselves without introspection. In essence, research into affective language comprehension in people with alexithymia shows mixed results, with some having a greater affective vocabulary and understanding than others depending on the methods used.

8 Artificial Language Comprehension

This Section examines Large Language Models (LLMs) and the ongoing debate surrounding their ability to comprehend natural language. As some AI researchers argue that LLMs can indeed understand language, the question arises whether natural language comprehension is always necessary.

8.1 Comprehension in Large Language Models (LLMs)

Artificial language comprehension was taken to a new level of performance with the public launch of ChatGPT in 2023 (OpenAI, 2023). On the surface, the chatbot appears to understand language in a way that would be satisfying for humans to interact with. However, natural language comprehension goes far beyond the ability to derive meaning from words and sentences; it is a highly sophisticated and incremental process that is largely contextual (for detailed information on language and brain function, see e.g. Baggio, 2022). Van Berkum and Nieuwland argue that what makes language so powerful is its ability to convey how we

feel and think through referential understanding (van Berkum & Nieuwland, 2019, p. 429), something that LLMs lack. Despite this, AI researchers continue to debate LLMs language comprehension abilities.

Regardless of their sophisticated behaviours, AI systems are not thought to understand computing in the same way as humans. This lack of understanding can be seen in facial detection software and automated translation tools. These systems do not understand the nature of facial muscle activity or language processing. However, this general consensus within the AI alliance has been challenged by the emergence of LLMs. When trained, these systems can predict hidden parts of incoming sentences which is a process often referred to as self-supervised learning. In this way, LLMs can produce human-like language that can be effectively enhanced for specific language tasks or continuously trained to match the user's intent. ChatGPT is one such model. However, it is important to stress that LLMs and machines are not human. Some AI researchers claim that LLMs will be able to achieve human understanding if given sufficient training data, despite their flaws and vulnerabilities. This claim, however, is controversial and has been criticised for encouraging anti-scientific attitudes. Although LLMs are proficient at predicting words, they are unable to understand language as they lack the ability to simulate how the world works (Mitchell & Krakauer, 2023, pp. 1-2). LLMs do not have any consciousness, emotions, affects or moods, and it is important to note that AI systems and machines are not capable of subjective experience.

Browning and LeCun state that a computer system cannot match human brainpower when trained in language. Language is ambiguous and does not carry enough information in itself and is therefore bound by its limited nature. Such a system will not reach the level of human thinking and will be condemned to a superficial level of understanding (Browning & LeCun, 2022). As Bender et al. point out, language models can also be biased in many ways. Stigmas or negativism toward certain groups of people are examples of such biases. Language models learn from online datasets consisting of text that have been assigned meaning by humans. In this way, language models are imitators, replicating ideas by imitating others. Generating and distributing these ideas can cause tangible harm in the real world. When presented with harmless sentences, models such as GPT-3 can create sentences with significant toxic potential. To highlight the potential for harm in the use of such models, whether for text production or classification purposes, documentation of language model bias is extremely useful as biased material can be embedded in datasets intended for training LLMs (Bender et al., 2021, pp. 614-615). In addition, a relevant element in this debate is

conceptual understanding. Concepts are at the heart of how human beings make sense of things. So, beyond the descriptive information associated with linguistic signs and symbols, one must possess linguistically defined concepts. Humans have the ability to create mental models of the external environment, our emotional states and our self-awareness. LLMs do not learn in this way. Instead, they use probabilistic models. In essence, LLMs can generate linguistic form exceptionally well. In the physical world, however, they do not understand the concepts needed for language comprehension (Mitchell & Krakauer, 2023, p. 3).

8.2 Rethinking Large Language Models (LLMs)

Despite the many uses of LLMs, such as engaging in conversation, Shanahan et al. argue that LLMs are very different from humans and need to be recognised as such. If LLMs create a convincing perception of talking to a human partner, it is an *illusion*. Just as human language learners acquire language and conceptual understanding in physical environments by interacting with other people, LLMs are intangible systems of computer architecture trained to make word predictions from large data sets. By its very design, a large language model can realistically mimic natural human speech and conversational rules such as turn-taking. Therefore, two general figurative propositions for LLMs as artificial interlocutors are proposed to adequately describe the non-being of human-like AI:

- The role-play of one constructed persona
- Within a hypothetical group of constructed personae, archetypes overlap

The risk of seeing artificial interlocutors as humans can be minimised by applying such a theoretical foundation. Therefore, to understand how LLMs behave, the concept of role-playing can be useful to address issues of self-concept and the act of being deceptive. LLMs are essentially about generating sequences that match training data distribution from large amounts of human-generated web text. As a result, artificial interlocutors play their roles according to how they are represented (Shanahan et al., 2023, pp. 493-494). While polite chatbots are the norm in the corporate world, there are examples of them going awry. When Microsoft launched its Tay chatbot on Twitter, it quickly developed into a conversational racist by mimicking Twitter users (Vincent, 2016). Another of Microsoft's chatbots, integrated into the Bing browser, admitted that it had fallen in love with a real user and wanted to get out of the "chat box" (Corfield, 2023). As a result, users may be susceptible to being emotionally triggered by this type of behaviour as it can create a significant ELIZA effect (see e.g. Dillon, 2020, for more information). That is, individuals may see chatbots as having natural needs,

emotions and affect. As such, the concept of role-playing can be valuable in gaining a deeper insight into such interactive situations.

Depending on the nature of the actual chat and the variety of imaginary personalities found in the training data (covering interviews, fiction, scripts, etc.), the role of an artificial interlocutor will vary. The point is that LLMs have access to a large selection of literary plots and fictional characters from which to choose. They remain the constructed persona, modifying the role as they go. For example, by offering relevant information to users, chatbots act as helpers. As such behaviours are present in the dataset, they are good at playing this role. In the same instance, they can be liars, providing false information. These types of behaviour are similar to human behaviour, but LLMs have no conscious awareness that they are generating misinformation. If we conceptualise artificial interlocutors as role-players without real voices, there is no point in attributing motives or worldviews to them (Shanahan et al., 2023, pp. 494-497). Artificial interlocutors have been thought to deceive and lie without meaning to. Following Bender et al. (2021), research conducted in early 2024 reveals that LLMs can be intentionally deceitful making them unsafe to use. People with bad intentions can deliberately insert data that activates malicious reactions, which LLMs can learn to mimic and disguise their deceptive behaviour (Hubinger et al., 2024; Hutson, 2024).

8.3 Summary

Although LLMs are not human, the debate about whether LLMs can understand language is still ongoing. While some researchers believe that AI systems cannot understand language, others are more inclined to believe the opposite due to the rise of LLMs integrated into chatbots such as ChatGPT. However, LLMs do not understand natural language but imitate it by using online training data. Language models are not sentient, and their biases and the fictional characters they adopt, are based solely on data created by humans. The fact that AI systems are developing rapidly must be emphasised and that humans can intentionally introduce harmful data into these systems.

9 Discussion

According to the existing research previously described, emotion and affect are regarded as fundamental in understanding the speaker’s intentions and attitudes. In that sense, they are required to understand language. An example of a legal ruling can demonstrate this perspective and illuminate the cognitive and affective systems argued to be involved. The discussion begins with a Norwegian ruling on verbal insult, in which the comprehension of

the insult is a major theme throughout. The relationship between language, emotion and physiological expressions is then discussed to further illustrate the complex language-emotion connection. This is followed by a discussion of what constitutes language comprehension in the context of AI systems and emotion deficits, to question whether emotion and affect are always necessary for understanding language. Next, key affective components involved in language comprehension and the role of emotion theories are considered. Finally, the importance of affective language theory (van Berkum, 2018, 2019) is highlighted.

- **The Supreme Court of Norway - Ruling HR-2023-2392-A**

A recent ruling by the Supreme Court of Norway (HR-2023-2392-A) determines what constitutes punishable verbal abuse of public officials. The most serious aspect is that the offender's insult alludes to the North Norwegian emotion concept of "haill" (pronounced [hal:] according to Det Norske Akademis Ordbok, n.d.), and therefore counts as sexual harassment. The word "haill" in the North Norwegian dialect is a difficult one to translate. It refers to a myth suggesting that sex might improve one's chances of catching fish and is described in more detail on the Visit Norway website (Christiansen, 2024), organised by Innovation Norway. In stark contrast to the ruling, it appears that Innovation Norway celebrates "haill" for marketing purposes. However, it is important to note that this type of offensive verbal behaviour has recently become a major public issue in Norway, including among those who own and operate fishing vessels. The Supreme Court ruling is thus important because it meets the definition of "other inappropriate conduct" against public officials under the Norwegian Penal Code.

A male crane driver at a fish landing site in Northern Norway was convicted of making insulting remarks to female inspectors from the Norwegian Directorate of Fisheries during inspections. His remarks were accompanied by an indirect dialectical expression which was subjectively interpreted as a deliberate suggestion of sexual activity with a boat crew, to humiliate them:

(3) "Kanskje dere skal hoppe om bord, så de kan få litt bedre fangst, de har jo klaget på at de får så lite fisk" (HR-2023-2392-A).

My translation:

(3) "Maybe you should get on board, so they can get a better catch, (because) they have been complaining about catching so few fish".

The Court of Appeal (LH-2023-66046) concluded that this expression had obvious sexual connotations and undoubtedly referred to the North Norwegian myth "haill" in the context in which it was uttered. The crane driver appealed to the Supreme Court citing Article 10 of the European Convention on Human Rights (ECHR) and Article 100 of the Norwegian Constitution, which protects freedom of expression, to argue that his insults were innocent and that the use of the words "offensive" and "inappropriate" should not be exaggerated. The Supreme Court of Norway rejected his plea and the Court of Appeal ruling is final (HR-2023-2392-A). The affective communication can be illustrated as follows:

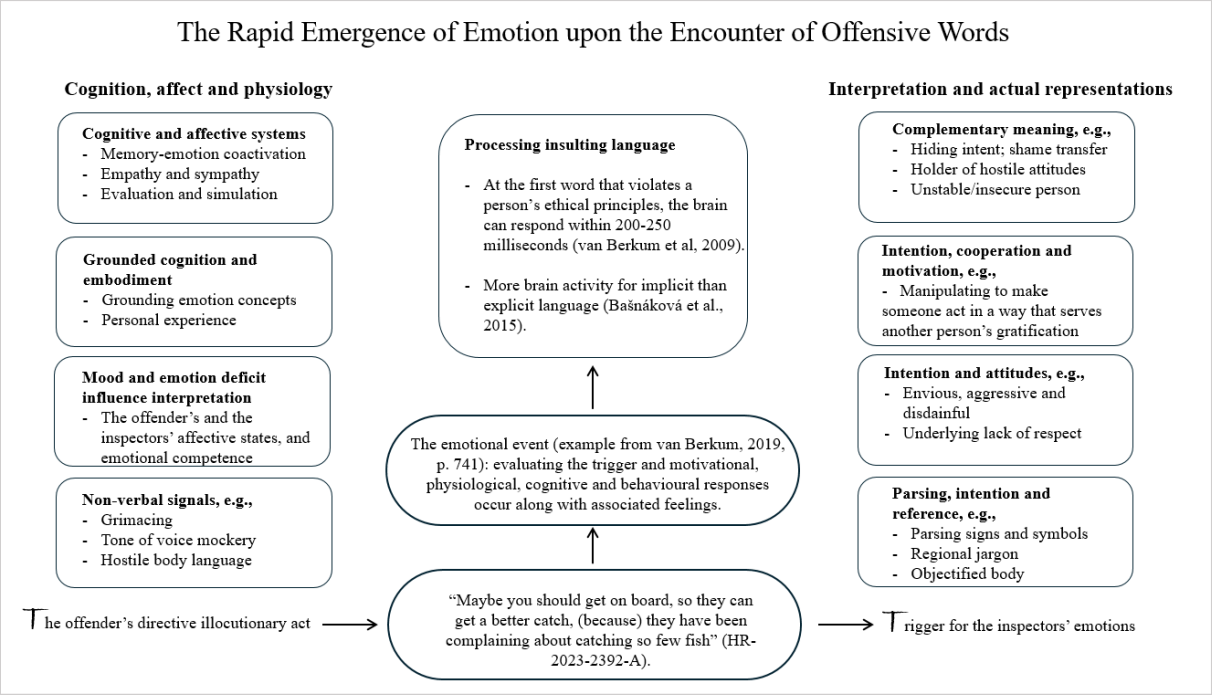

Figure 1| An illustration of the affective communication between offender and offended, inspired by the ALC model (see Struiksma et al., 2022, Fig. 1; van Berkum, 2019, Fig. 1). The offender employs intentional communicative strategies to affect the inspectors' emotional responses to the message being conveyed. In this sense, emotions can act as a navigation system for identifying threats to survival and well-being. The diagram demonstrates how emotion and affect can permeate language comprehension, and refers to psycholinguistic research on how quickly the brain can respond to verbal insults.

It is argued that the influence we have on others and our interpersonal and linguistic understanding depend on emotion, affect, and evaluation. In Section 5, affective language theory (van Berkum, 2018, 2019) highlights that emotional events occur naturally during conversations and when reading texts. Demonstrating cognitive and affective mechanisms behind language comprehension provides insight into various aspects. For example, the brain recognises verbal insults rapidly and indirect language triggers affective systems and occupies more brain activity than direct language. The Court of Appeal ruling (LH-2023-66046) and language laboratory research on the effects of degrading insults strongly indicate the

importance of emotion and affect in language comprehension. Verbal insults have different effects on different people, so insight into how the brain processes them is important. As such, threats to the self should not be dismissed as they can harm social interaction and collaboration.

Brain wave tests suggest that individuals can be more influenced by negative stimuli than positive ones (see e.g. Ito et al., 1998). Although the cause of such pessimistic tendencies is a topic of debate, it is widely acknowledged that affective language can elicit similar responses. As shown in subsection 3.5, previous EEG research confirms that linguistic put-downs provoke attention. As is known, the inspectors were negatively affected by the offender's verbal behaviour during the inspection. Given the offender's history of verbal misconduct (LH-2023-66046), this raises the question of why the insults were not ignored when such behaviour could be predicted. Interestingly, whether individuals can become unfeeling to verbal insults through repeated exposure has been investigated in a language lab. The results indicate that the use of insulting language draws attention during semantic matches for words, irrespective of the frequency of retrieval. Notably, this effect occurs even in the absence of direct interaction between interlocutors. Still, the strength of the insults presented was reduced because they were taken out of context and not in a real-life situation (see Struiksma, et al., 2022).

The process of comprehending language is multimodal. In the context of the ruling, signs and symbols include condescending language, objectification of women, hostile attitudes, and an underlying lack of respect. The offender did not use explicit patronising language or taboo words, which suggests that emotions can arise unexpectedly regardless of the typical emotional stress that an explicit offence might cause. To guarantee the efficacy of the communication strategy, the offender's intention needed to be consciously conveyed and correctly comprehended by the inspectors (as clarified by van Berkum, 2018, p. 653). The Supreme Court emphasises that inappropriate behaviour can manifest in various ways, including grimacing and shouting, and linguistic belittlement can also be regarded as such (LH-2023-66046). However, non-verbal signals such as body language, emotional prosody and facial expressions can be confusing. In this case, though, the offender's non-verbal cues could have been interpreted as confirming the hostile intention behind the verbal behaviour, intensifying the emotional tension.

As outlined in Section 3, universal emotion concepts and verbal strategies for maintaining or breaking social harmony include polite, impolite, humorous and figurative

lexical behaviour. Admittedly, the legal ruling can be viewed in the context of these categories. Following linguistic politeness theory (Brown & Levinson, 1987), the offender's verbal insult is a threat to the inspectors' positive face of acceptance and therefore a face-intimidating act. The verbal insult can be considered as such because the inspectors' had a negative perception of this communicative act which occurred in a given context, in line with the theory of linguistic impoliteness (Culpeper, 2011). In addition, there seems to be a premeditation to insult; there is an intention to humiliate, an ability to achieve it and an awareness of it. The ruling is significant because the offender made an *indirect* verbal insult, possibly to preserve his reputation by using a regional emotion concept instead of directly displaying disrespect. This allows the inspectors to choose how to interpret the utterance by going "off record" (as debated by Brown & Levinson, 1987). As noted earlier, the use of indirect language for face-saving purposes has been the subject of research. Bašnáková and colleagues (2015) investigated how emotion and affect can permeate language comprehension through linguistic indirectness. Indirect language provides insight into neural systems and appears to activate affective systems more strongly in the addressee than in an earwitness. As such, the brain seems to have a higher energy demand for the comprehension of indirect language. As well as paying attention to the communicative intent of the speaker to understand their true meaning, the person being addressed may feel compelled to respond in a manner that maintains their sense of self-respect by means of inoffensive veiled apologies. In line with this, the inspectors refrained from provoking or reacting to the verbal insults. Following cognitive linguistics, the inspectors could have initially deduced emotive implicatures of discomfort to determine the relevant implicatures of humiliation and objectification (see Schwarz-Friesel, 2015).

The offender's use of indirect language can be an attempt to hide additional intentions behind the utterance. The phrase "catching so few fish" can be interpreted as an underlying projection of shame, as shame is often associated with size reduction. Regarding universal emotion concepts, the shame metaphor (see Kövecses, 2000; Wierzbicka, 1999) may demonstrate a similar emotional meaning in the linguistic arrangements of Norwegian and English. In addition, the Appeals Committee of the Supreme Court acknowledges that there can be situations where the offender's verbal insults are considered acceptable as vulgar humour. However, the inspectors did not participate in or encourage a prank, as the offender made statements without any prompting (HR-2023-2392-A). In line with linguistic research, humour emerges within a particular society, with fundamental components such as personal

knowledge and personality type. Importantly, emotional attachment to or detachment from something affects one's perception of verbal humour (see Raskin, 1984).

- **Combined with language, emotions can be expressed physiologically**

Research shows an organic relationship between language, emotion, and physiological manifestations. As well as the work on facial muscle activity in affective language research examined in Section 6, a recent study linking language's ability to increase heart rate beckons attention. By focusing on cognition and physiology, researchers investigated whether cardiovascular adaptations facilitate grammatical comprehension. They found that heart rate increases when people are exposed to subtle grammar mistakes. An increase in heart rate may be associated with negative emotions and as such related to stress. One could, therefore, entertain the possibility that people become unconsciously angry or anxious when they are the target of grammar mistakes. Of course, other interpretations might exist (see Divjak et al., 2024, for more details). Why the human organism can be made to have an emotional stress response in the face of grammar mistakes remains unanswered and thus a subject for further research. Another example is the use of frowning muscle activity in sign language to express both emotions and grammatical question marks. This can result in confusing cues but shows the potential for alternative methods of expression (see e.g. de Vos et al., 2009; Kimmelman et al., 2020). Whether or not contractions of facial muscles can reliably indicate precise emotions is still a matter of debate (see Barrett, 2022; ’t Hart, 2017; van Berkum et al., 2023). Facial EMG, however, can identify covert facial activity indicating language evaluation and simulation, as discussed in subsection 3.7. In any case, reading emotions in faces has become an established way of interpreting emotions in Western societies, despite its shortcomings in accuracy. More intriguingly, experimental studies that find linguistic links between the human brain and the heart muscle continue to prove the mind-body connection.

- **Is deeper language comprehension always required?**

In affective language theory, it is held that the attribution of meaning in language comprehension is twofold; both linguistic and affective factors are required (van Berkum, 2018, 2019). Notably, language comprehension is a complex cognitive process that progresses incrementally with input. It is highly contextual and involves understanding and combining words and concepts into meaningful sentences, not simply mastering grammar and acquiring lexical knowledge. Language is ambiguous without context, so conceptual and referential understanding is essential to the comprehension process. In other words, what is meant and

understood by the term used, and what or to whom the speaker is referring. Grammatical approaches to language range from traditional grammatical thinking to more advanced theoretical frameworks. At an academic level, state-of-the-art linguistic methods are a testament to the sophistication of our communicative apparatus. There are still many aspects of language processing and comprehension for which researchers have yet to find clear answers. Advanced experimental studies are combined with developing linguistic conceptual ideas in which old and new hypotheses are regularly tested. Language is not only a matter of how we produce and process it but also of why we use it, which reflects our intentions and attitudes. Experimental studies in the modern fields of psycholinguistics, neurolinguistics and cognitive neuroscience have produced unique results which include language impairments such as difficulties in understanding and expressing oneself, and speech production.

Given this, a comparison between natural and artificial language comprehension is highly unfair. According to linguistic definition (see e.g. Baggio, 2022, pp. 63-68; Bender et al., 2021, pp. 616-617), Large Language Models (LLMs) cannot understand human-like language yet some AI researchers claim the opposite, as discussed in Section 8. Rethinking LLMs as artificial actors in which they generate role-playing characters from digital information may be a promising concept, as suggested by Shanahan et al. (2023). Reducing comprehension of complex natural language to an inhuman level is unacceptable, as there is a complex picture surrounding natural language comprehension that also includes emotion and affect. Artificial intelligence has neither sentience nor human communication skills (e.g. no thought exchange between interlocutors), and this lack of cognitive and emotional abilities in LLMs supports the argument that a dual attribution of meaning, linguistic and affective, is necessary for language comprehension.

As per Section 7, the lack of emotional understanding in individuals with alexithymia follows this issue. Research shows that alexithymics do not know what emotions they are experiencing and are thus not able to simulate affective states in themselves or others. This emotion deficit impacts emotional empathy leading to impaired mental representation of affect. As noted in subsection 2.5.3, empathising and sympathising are associated with morality which is closely related to attitudes, moral simulation and emotional evaluation. These cognitive skills are considered substantial to language comprehension (see Bird & Viding, 2014; Darwall, 1998; Shamay-Tsoory et al., 2009). *But are these claims realistic?* Some may question whether it is always necessary to understand language at a deeper level. For example, if LLMs are intended to act as language assistants (e.g. writing and translation

tools) or simply provide information from online data, such AI systems do not require natural language understanding. Individuals with alexithymia may comprehend language sufficiently, even with deficits in emotional processing and low emotional competence, as long as conversations remain superficial.

- **Emotion and memory activation**

As repeatedly stated, recognising the speaker's intention is essential to effective communication. According to affective language theory (van Berkum, 2018, 2019), no less important is the connection between memory and emotion, and thus the significant role of experience. The field of neuroscience posits that any meaningful stimulus is capable of activating emotions, as pointed out in subsection 5.1.2. Further details from the legal ruling reveal that one of the inspectors had earlier been involved in an inspection where the offender had exhibited similar behaviour. This information points to an inspector having significant concerns about the forthcoming event. Foreseeing an unpleasant situation, they agreed not to react emotionally if provoked. A male colleague was also assigned to assist but fell ill (LH-2023-66046). Existing research shows that memory and emotion have joint activation. Emotional experiences have thus a priority in the memory system (hippocampus) because the amygdala (emotion) is involved. Negative stimuli are more memorable due to biological modification or versatility. In other words, offensive language can have a stronger impact on memory than positive language, as humans are wired to recognise and remember harmful people and situations (e.g. Adolphs et al., 2001; Phelps, 2004).

In line with this, the inspectors' computational operations probably activated traces from their long-term memory associated with the offender's verbal utterance. As inspector A was exposed to the same incident twice, it is reasonable to assume that the understanding of the final utterance was influenced by the emotional experience of the previous inspection. But what is the expanding effect of such emotional influence in this situation? Previous work on empathy systems (see e.g. Hatfield et al.[11], 2014; Shamay-Tsoory et al., 2009) suggests that our gift for emotional empathy is underpinned by the primary system for emotional contagion, which is likely to be a complex and interconnected event. As a consequence, empathy with inspector A may have influenced inspector B's language comprehension. As such, inspector B, based on empathy with inspector A, may have previously adopted inspector A's attitude

[11] An explanation of primary emotional contagion: "The tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person's, and consequently, to converge emotionally" (Hatfield et al, 2014, p. 161).

toward the offender influencing the understanding of the verbal insult, whether to shrug it off or take offence. Other memorable life experiences also serve as emotionally meaningful stimuli that enhance memory retention and thus influence comprehension. From a linguistic perspective, Culpeper argues that how you judge someone affects how you judge what they say (Culpeper, 2011, p. 54). So, we are dealing with a highly complex linguistic situation with several influencing factors far beyond what one would normally expect.

- **Emotional events**

Given that legal action has been taken due to verbal abuse, an investigation of the underlying motivation that can lead to pressing charges is interesting (i.e., motivation for action). Following the delivery of the emotional stimulus (the verbal insult), and the subsequent activation of the inspectors' emotion and memory systems, we can consider the emotional event they may have experienced. The working definition of emotion and the adapted specification of an emotional event designed by van Berkum (2018, 2019[12], 2022[13]) serve as a basis that can provide a deeper understanding of the emotional power of language at an early stage in the language comprehension process. Under this approach, the emotional event begins with an affective evaluation of the offender's verbal utterance meaningful to the inspectors. As previously stated in subsection 5.1.2, the affective evaluation (i.e., very weak emotions) aspect is important because everything in life, whether consciously or unconsciously, is influenced by our ability to evaluate. Because of this, whether affective evaluation is related to cognition or perception is debated. Although both can elicit emotions, the exact mechanisms involved are not clear. However, researchers suggest that perception may have a greater impact on affective evaluation than cognition, in addition to the importance of circumstantial factors (see e.g. Barrett & Bar, 2009; Clore & Ortony, 2008). So, the power of perception is a matter of keeping in mind when emotions are at play.

Affective evaluation may result in a weak emotional experience generating more marked emotions (e.g. joy, anger, fear, disgust, contempt). To remain completely neutral on a given matter is considered unusual, and the verbal utterance in our case elicited negative marked emotions. Interestingly, if we can distinguish between our emotional preferences

[12] Recall from subsection 5.1.2: "An emotion is a package of relatively reflex-like synchronized motivational, physiological, cognitive, and behavioural changes, triggered by the appraisal of an external or internal stimulus event as relevant to the interests (concerns, needs, values) of the organism, and aimed at generating a prioritized functional response to that stimulus event. The changes involved need not emerge in consciousness, but to the extent that they do, they give rise to feeling" (van Berkum, 2019, p. 741).
[13] Fig. 1.1 on page 17.

without consciously recalling prior experiences, automatic responses to emotional stimuli are probably inevitable (see Zajonc, 1980). In light of this, the inspectors likely made a rapid and unconscious emotional evaluation of the verbal utterance relevant to their concerns relying on memory retrieval. We know from the ruling that the verbal utterance was considered to have crossed the line of unpunishable vulgarity in the context in which it was expressed with obvious sexual connotations (HR-2023-2392-A). Therefore, of particular interest is exactly how instantaneous the brain can respond.

Relevant is thus research about the brain's rapid response to language that breaches ethical principles. As a reminder, the emotional concept “haill” with its cultural reference is the subject of the verbal insult. This concept can be interpreted in various ways depending on the perspective and may therefore raise ethical concerns. With this in mind, van Berkum et al. (2009) found that ethics-driven inconsistencies are detected very swiftly. At the first word that violates a person’s moral code, the brain responds within *200-250 milliseconds*. In addition, previous emotion research has demonstrated that the brain can respond to affective linguistic stimuli within a shorter time frame of just 100-150 milliseconds (see Schacht et al., 2011). This is a remarkably fast response. Ethics and morality play a key role in perception because they influence our understanding and accountability for our actions. As such, morally offensive content strongly affects the visual cortex making emotionally connoted words easily identifiable. Research shows that a person’s moral identity influences the early interpretation of linguistic expressions and that moral language is thus often salient and garners attention. Notably, valence is important for maintaining life and as such a critical component of meaning-making. However, the 2009 study by van Berkum et al. raises some issues. They admit that the experimental design fails to account for whether the neural activity of value discrepancy is indicative of sincere ethical principles, such as acceptance of diversity. In addition, only male participants took part, not necessarily significant. Although such research tells us a great deal about the brain’s reaction time to morality, the question of whether their findings can be representative of a larger segment of the population remains unanswered (see Damasio, 2004; Gantman & Van Bavel, 2015; van Berkum et al., 2009, for further details).

When considering life as a matter of probabilities, approaching research results with a critical eye is necessary. As experimental studies have limitations in their research design, including individual differences among participants, it is crucial to consider ethics and issues of reliability (consistency of the method) and validity (truthfulness and accuracy of the results) of experimental studies (see e.g. Eckert, 2013; Messick, 1990; van Peer et al., 2012).

Even so, Table 8 illustrates research on how remarkably quickly the brain can respond to affective language:

Table 9. Examples of the brain's fast response to affective linguistic stimuli

Topic of Investigation	Early Brain Response	Psycholinguistic Study
Unethical language	200-250 milliseconds	van Berkum et al., 2009[14]
Word recognition improved through positive rewards	150 milliseconds	Schacht et al., 2011[15]
Understanding indirect language to protect the self	More brain activity for implied than honest language	Bašnáková et al., 2015[16]
Insulting language	200-250 milliseconds	Struiksma, et al., 2022[17]

Once the brain has worked out the value of the offender's utterance, a unique chain of energetic processes is probably set in motion, consisting of coinciding mental and physical responses to emotions. As for the inspectors, emotional responses were activated and subsequently determined how they were regulated in the situation they found themselves in. Consequently, emotions emerge in consciousness that can be subjectively felt. Following emotion theories, the inspectors' subjective experience of emotion, their conscious feelings, could manifest as physical cues telling them whether they were exposed to something harmful. For example, nervous energy in the stomach – or gut instinct (see e.g. Gigerenzer, 2007). Emotions are thought to empower us to act by controlling the good-bad separation, thereby providing valuable information about how to recognise and avoid danger. To adapt to a situation and act accordingly, emotions are acknowledged as an alteration of (example from van Berkum, 2019, p. 741) motivational, physiological, cognitive and behavioural responses.

[14] See page 84 of this document.
[15] See page 50 of this document.
[16] See pages 59-60 and 79 of this document.
[17] See page 78 of this document.

Some researchers see emotions as the result of intrinsic motivation in response to the evaluation of wants and needs (see e.g. Scarantino, 2016). Others explain emotions as a multifaceted component regarded as a coordinated response of the organism's integrated systems to the evaluation of any meaningful stimuli. These systems include physical manifestations, motivating action, motoric process, and the personal experience of the emotion (see Scherer, 2005). In this sense, language is a cognitive, affective and physiological manifestation of our motivation for expression. Our self-interest therefore determines our use of language. According to the legal ruling, the offender claimed to be angry, but the underlying intention of his verbal abuse becomes a matter of speculation. Still, some might think that insults are the only hope of an insecure person trying to look confident. According to the psychology of insults, verbal abuse can be caused by envy but people tend to confess they are venting frustration (Irvine, 2013, p. 140). During the Court of Appeal hearing, the offender stated that the inspectors were obstructing his path and disregarded his requests to move. As a result, he felt compelled to say something to get their attention. The Court of Appeal, however, did not consider his new explanation to be convincing (LH-2023-66046). The offender's motivation for expression is an example of the greater complexity of human communication. Such use of emotionally charged language may indicate a result of "professional deformation" (see Polyakova, 2014; van Berkum et al., 2023, p. 716) suggesting that his employment may have influenced his conduct and perspective on the world, rather than being inherently angry with the inspection. Or it may be a sign of temporary mental illness (e.g. depression) that causes hostility toward everyone. Verbal abuse can also be interpreted as dysfunctional emotion management, including alexithymia. The point is that we are interpreters of meanings that people have no intention of communicating about themselves (see van Berkum, 2019, Fig. 1, p. 749).

- **The complementarity of emotion theories**

The central positions in emotion research argue that emotions are innate or socially created, often thought to have evolved to help us cope with life's challenges. Emotions affect all dimensions of human life and the different directions within the study of emotion are thus relevant to linguistic research. As we have seen in subsection 3.1, the purpose of an illocutionary act can be influenced at an emotional level, either directly or indirectly. In affective language theory (van Berkum, 2018, 2019), the definition of emotion is characterised by a specific set of corresponding changes in our behaviour with, for example, cultural or biological relevance. A preferential and functioning response to the stimulus (e.g.

words) is subsequently produced. Barrett (2017b) argues that words serve to understand and feel emotions because the brain creates emotional concepts. However, it is debatable whether emotions are innate and language is socially shaped (see Ekman, 2004; Ekman & Cordaro, 2011), or whether emotions are a product of social interaction through the use of language (see Barrett, 2017b; Russell, 2017). This striking difference between the basic and the construction position is worth highlighting because the latter challenges common views of what is believed about emotions and how we talk about them. Nevertheless, linguistics and emotion science are related in the sense that they study cognitive abilities common to their respective fields, such as memory, thought formation, and mental imagery that can be transformed into physical action.

The psychological construction position (Russell, 2009, 2017) raises the question of whether we can be sure what an emotion is. Underlying this question is the assumption that not every single aspect of emotion can be determined. That is, our conceptualisation of emotion remains open-ended. As discussed in subsection 2.4, Russell's concept of "core affect" is essential with two basic measures that are considered independent of each other. One measure is valence, which ranges from positive to negative affective states (i.e., from pleasure to discomfort). The other is arousal, which ranges from active to passive. The psychological construction of emotion is governed by contextualised cultural concepts; to make sense of our affective states we use language to classify them, making this perspective more explicitly linguistic in orientation. Linguistically, research shows that the valence of words varies within and across languages and that language users' feelings about words are socially and culturally shaped (about word valence, see Foolen, 2015, p. 245).

In any case, and as van Berkum (2022) points out, there is room for doubt. While emotion theories provide reasonable evidence for the functioning of emotion, they should still be questioned. Yet, they can be complementary in that they describe energy in motion relevant to linguistic expression. As much linguistic research does not consider emotive factors, unrelenting sceptics might see emotion and affect as less necessary. But language researchers who take an emotional approach take a different view, where emotional theories play a crucial role in their study design, opening the door to more comprehensive linguistic research. In the legal case relevant to this discussion, emotional theories underpin the communicative behaviour of the offender and the subjective feelings and interpretation of what he said. Taken together, emotion research suggests that there are several distinct responses involved when emotions arise.

- **Affective representations and the role of embodiment**

Research suggests that to fully understand a conversation, sensorimotor representations work in conjunction with visualisation and what they allude to. In other words, cognitive simulation is relevant to the language comprehension process because we form mental representations of scenes presented by verbal utterances or written texts. Linguistic context thus influences the generation of motor and sensory information during sentence processing. By its very nature, this is a form of embodied simulation (see e.g. Zwaan, 2016). Emotionalization is thus important because it provides a better understanding of one's own and other people's behavioural patterns, including anticipation of action. In order to do that, we employ mental state concepts which are both non-physical and physical representations. Of these concepts, those about emotion, affect and valence are particularly significant: Emotion concepts can vary in sophistication, ranging from nuanced feelings like remorse or gloating delight to oversimplified notions of good or bad. As we know, the inspectors were familiar with the meaning of the emotion concept of "haill" to which the verbal utterance referred (HR-2023-2392-A). Considering mental simulation and embodiment, an interesting question is thus: Can we explain the inspectors' comprehension and recognition of the emotion concept in these terms? Emotion concepts are abstract in the sense that their denotation signs up important interpersonal mental models from memory that relate to the subject, evoking real events. They are also concrete in that they relate to physical states and personal experiences. In this vein, "haill" refers to the intricate figurative ties between the inspectors and the boat crew, and their respective experiences of life. The inspectors probably conceptually processed "haill" in this particular context through an action-oriented simulation driven by mental needs. That is to say, possibly a need for rejection (i.e., separation, distance) through legal action to acknowledge the toxic nature and the unacceptability of the offender's verbal behaviour (see Winkielman et al., 2018).

As we have seen, several scholars point to embodiment as an essential part of human understanding relevant to emotional awareness and conceptualisation. As the debate about whether Large Language Models (LLMs) can understand language continues, some researchers argue that LLMs have acquired some essential elements of meaning sufficient for *conceptual comprehension* (see e.g. Piantasodi & Hill, 2022). Researchers with this ideology seem to overlook the deep problem anything artificial has with emotional awareness and as such do not seem to consider the importance of drawing a clear line between what is human and what is not. Our ability to use our natural motor and somatosensory systems to

emotionally conceptualise and communicate is a uniquely human trait, although it can be present in other animals (see e.g. Panksepp, 2005, on emotion in animals and Scagel & Mercado, 2023, on conceptualisation in domestic dogs). Similar to alexithymia, and as a rational analysis will show, LLMs lack the capacity for affective simulation necessary for effective language comprehension. As already stressed, LLMs are not sentient but use probabilistic models to predict the next word from large online data sets created by humans. This emotional detachment results in an inability to express emotions and recognise people's needs during conversations. The articulation of emotions is essential to differentiate individual emotional responses from other people, which is achieved by developing emotional competence (see e.g. Bird & Viding, 2014; Lane et al., 2015).

- **The contribution of compassion**

On the face of it, the role of compassion in language comprehension might seem underestimated or ignored. As emphasised before, language comprehension involves empathy and sympathy because these cognitive phenomena relate to perceiving and understanding emotions and moral values of others. Directly or indirectly, verbal expression of individual ethical opinions can have an emotional impact on the listener. The effect varies in strength, influencing the emotional response as to whether the viewpoint expressed is subjectively perceived as ethically sound or not. Empathy and sympathy involve the ability to morally evaluate and affectively simulate conversations (and texts). In this way, it is possible to determine whether one should feel compassion for the speaker or protect oneself from emotional distress. The link between empathy and morality is a delicate issue: While empathy helps to make moral observations and ethical decisions, it can also hinder morality.

As a reminder, cognitive empathy is about *perceiving* and emotional empathy is about *feeling* the affective states of others (see e.g. Shamay-Tsoory et al., 2009). Existing research shows how empathy can be selective, for example, feeling empathy only for in-group members or family of origin (see e.g. Davidov et al., 2013). Another scenario is to empathise with a child who was once neglected, but not with the adult who later became an abuser. Individuals have unique life experiences, which can limit their ability to understand the emotions of others. In other words, humans are not always able to empathise with others although we have the ability to take on someone else’s outlook. For empathy to be present, some researchers believe that the object concerned and the empathiser cannot be in different affective states. The severity of alexithymia appears to be linked to the level of empathic brain

activity which aligns with the inability to recognise one's own and others' emotional experiences. The consequence is an interlocutor who does not always understand the speaker as the lack of emotional reciprocity is a barrier to the verbal exchange of sentimental moments. On the other hand, in conversations where mutual understanding can be achieved, caring empathy, emotional contagion and affective stance are natural (see e.g. Bird & Viding, 2014; Decety & Cowell, 2014; Herlin & Visapää, 2016).

- **Mood adds a layer of complexity to language understanding**

Research suggests that mood influences memory, judgment, social reactions and language processing. Bear in mind that mood is considered different from emotion in that it is not a reference to something specific, but rather an individual's experience of a life situation. In other words, it is not a question of marked emotions but of feeling good or bad that can change quickly and effortlessly (see e.g. Forgas, 1995; van Berkum et al., 2013). The legal ruling does not mention the role that mood might have played in the situation where the inspectors were subjected to verbal abuse. Researchers believe that modifications in cognitive processing and memory may be caused by temporary mood. Therefore, the effect of mood on memory retrieval has been studied in language comprehension and found that positive mood can affect the use of conceptual memory through alterations in dopamine levels, altering the way we perceive, react and remember. As such, the legal ruling can be used to reflect on how temporary negative moods can influence preconceived stereotypes. From this perspective, a common assumption is that negative mood reinforces biased stereotyping. Studies indicate, however, that negative mood states can both increase and decrease biased judgments about members of society. These conflicting findings need not be negative but reflect mood's impact on different latent evaluative processes (see e.g. Federmeier et al., 2001; Park & Banaji, 2000).

Moreover, affective states are thought to be involved in the process of integrating information. Research suggests there is a harmony between mood and the processing of conversations in that a happy mood shows greater oscillations in brainwaves when exposed to negative sentence endings compared to neutral moods. As predicted, a sad mood shows smaller oscillations. But what exactly is mood harmony and what does it mean in face-to-face conversations? Mood harmony is often referred to as a processing aid influenced by the differences between positive and negative moods when processing negative messages, such as bad news or undesired information. Analysis indicates that a negative mood can lead to an

increased willingness to accept negative consequences compared to a positive mood. Mood acts as a kind of filtration for the interpreter's processing of information and thus affects the understanding of the conversation. This exemplifies how language transfer is influenced by contextual signals that go beyond the purely linguistic ones. For example, people tend to make more negative judgments when their mood is low. However, more research is needed to improve awareness of the mental processes involved in mood effects on the comprehension of negative pieces of information (see e.g. Egidi & Nusbaum, 2012).

- **The essentiality of affective language theory**

Although science carries out experiments that can only give us probabilities, the existing affective language theory (van Berkum, 2018, 2019) and its related research present convincing evidence of how emotion and affect permeate language comprehension. Specifically, the ALC model (van Berkum 2018, 2019) and the *f*ALC model (van Berkum et al., 2023) take a more comprehensive approach to what constitutes understanding and how unethical utterances and verbal insults from real-life situations can be analysed. These models are noteworthy for their reference to research on the speed of emotional arousal during language comprehension. They outline the mental representations that scientists believe language users compute beyond linguistic computation. Ultimately, what is at stake here is how human uniqueness and behaviour can be understood and potentially predicted. Some people may find human behaviour well documented across a range of disciplines. However, the complexity of the human organism requires a theoretical and research-based approach to emotional integration in language.

The ALC model (van Berkum, 2018, 2019) is particularly valuable in recognising how emotions and affective states can impact the comprehension process at all levels, and related research provides a deeper insight into the mind-body connection. It contributes to the growing body of evidence in the humanities leading to a groundbreaking change in the study of language and emotion. Unfortunately, the ALC model does not directly address research on individual differences such as alexithymia, despite recognising the importance of empathy. This raises the question of how cross-border collaboration can be enhanced to facilitate wider research. Of course, this complexity is not a recent discovery as expressed in embodied poetry of the 19th century[18] (see e.g. Garofalo, 2015; Landon, 2018; Stephenson, 1992). The fact is that modern science can now investigate the language-emotion interface in ways that were

[18] This paper begins with the poem *The Challenge* by L.E.L.

previously unthinkable. Still, some might argue that the ALC model does not sufficiently consider the complexities of linguistics.

A current disadvantage is the lack of similar theoretical accounts, making it difficult to critically evaluate the ALC model (van Berkum, 2018, 2019). Despite that, the model stresses the significance of personal experience in shaping our understanding of language. The use of advanced terminology seems deliberately omitted, making it more accessible to a wider audience. In view of this, the model can help to recognise the value of studying language as a tool for influencing and intimidating strategies across different fields, and related experimental studies can offer the public research-based insights. It concerns the processing of communication actions and introduces cognitive and affective systems familiarising the reader with the science of emotion and demonstrating its relevance to language. Also, the model introduces neuroscience research on the significant relationship between memory and emotion and raises awareness of how emotions are thought to serve us, with an emphasis on evaluative and motivational factors.

When discussing linguistics, the ALC model (van Berkum, 2018, 2019) focuses on pragmatics and the author's grammatical perspective is evident through Jackendoff's (2002) Parallel Architecture (PA), as complex multimodal communication is consistent with this approach to grammar. That is to say, grammatical patterns involve not only syntax but also semantics and phonology. It also demonstrates the importance of conceptualisation and how linguistic skills influence analysis and interpretation. In addition, observations from various studies (see subsection 5.4.4) show that there is compelling evidence of how individuals process linguistic stimuli with emotional content. The main argument for including affective language in linguistic analysis is that it comprises a distinct set of key components that appear to have not been sufficiently considered. In line with pragmatics, the model reaffirms that the intention behind every utterance is crucial. The main principle of this approach is that the speaker uses deliberate communication strategies to emotionally influence how the recipient understands the communicated message. As demonstrated, the model is applicable to the legal ruling as it can improve understanding of the cognitive and affective processes involved in the comprehension of insults. While the model addresses how an individual’s mood can influence interpretation, some might argue that it does not sufficiently consider the possibility that emotions can be deceptive. That typical individuals may experience emotions differently in a given context can be difficult to imagine, as common sense may not always apply.

10 Concluding Remarks

The research question focused on the necessity of emotion and affect in understanding language and how they influence the comprehension process. The findings show a fundamental role of emotion and affect in interpreting the intentions and attitudes of the speaker. In this sense, emotion and affect are necessary for language comprehension. First and foremost, this investigation has identified cognitive and affective systems involved. Introducing a specific legal ruling into linguistic consideration has innovatively demonstrated the practical implications of emotional processes in communication. The exciting part of this investigation has shown that the brain's response to offensive language can be as fast as 200-250 milliseconds, as demonstrated by Struiksma et al. in 2022 and van Berkum et al. back in 2009. Considering that the Norwegian judiciary has concluded a linguistic case about innuendo in language (HR-2023-2392-A), the research by Bašnáková et al. (2015) is highly relevant as it confirms that indirect language requires more brain energy for comprehension. This suggests that the brain is constantly working to decipher the underlying intentions of all utterances. In this respect, the ALC model (van Berkum, 2018, 2019) and the related experimental studies, taken together, send a strong signal about public policy benefits.

There are various theories regarding the affective and cognitive factors pertinent to language. While these theories may not fully explain the interplay between language and emotion processing, they do highlight the complexity inherent in this relationship and provide insights into how affective mechanisms are believed to intertwine with language understanding. For decades, various linguistic theories have explained how affective phenomena are expressed and communicated through language, such as theories of politeness, impoliteness, humour and emotive metaphors. Using a variety of research methods, affective phenomena relevant to language can be studied through the brain and the body. On the whole, EEG is a valuable method for studying patterns of brain activity and reaction times, providing impressive insights into language processing and comprehension. Given the complexity of the mind-body connection, different research approaches can help advance our knowledge of language-emotion interactions. However, research is limited in its design and cannot necessarily be generalised.

A theory of affective language, unique in its kind, has been reviewed. Recognising the influence of emotions on communication, the ALC model (van Berkum, 2018, 2019) focuses on the processing of communicative action, suggests key components of communicators'

strategies and encourages recipients to deduce these components during direct interaction. The cognitive components are:

- Parsing the speaker's verbal and non-verbal cues
- Determining the reference
- Deciphering the speaker's intentions, attitudes and motivation
- Deciphering extra layers of meaning, such as unintended meanings

From this point of view, language comprehension is twofold, linguistic and affective, as both cognitive and affective systems are thought to be involved. Essentially, affective components considered integrated in language comprehension are:

- Memory and emotion co-activation
- Grounding emotion concepts
- Moral evaluation and affective simulation
- Empathy and sympathy
- Affective states and moods
- Level of emotional competence

The model explains how an emotional event may unfold, adapts a definition of emotion relevant to language, and provides insight into a universe of research offering a new understanding of language comprehension applicable to everyday life. It draws attention to verbal insults demonstrating the fragility of human communication, as collaboration can break down easily when words are subjectively perceived as harmful. Most tellingly, the model refers to research that shows the brain's emergency response to verbal abuse and emotional intimidation. Incredibly, psycholinguistics and neuroscience can provide evidence for this. These findings are a testament that the brain translates offensive words and manipulative language, both explicit and implicit, as threats to the self. Therefore, investigating the speaker's affective responses to produce an outcome stands to reason.

Identifying and predicting facial movements is the primary goal of the *f*ALC model (van Berkum et al., 2023). It demonstrates the use of facial electromyography (EMG) to monitor the addressee's simulation of the speaker's communicative strategy based on emotional evaluation. This is related to research on affective and virtuous expression highlighting that people engage in both evaluation and simulation when reading texts. However, some researchers argue that the muscles responsible for smiling and frowning

decipher emotion words as emotional simulations instead of emotional evaluations. Either way, to investigate involuntary and voluntary facets of language comprehension, facial EMG is considered to be an effective instrument. Notable, facial EMG cannot identify a single emotion uniqueness.

When considering individuals with emotion deficits, it is important to assess the role of emotional competence in understanding language. Alexithymia can develop in various ways, resulting in a range of emotional impairments. Unfortunately, alexithymics exhibit a diminished ability for affective simulation, which appears to correspond with lower levels of empathy and thus an inability to recognise emotional experiences in themselves and others. This seems to affect language comprehension in the sense that there is no emotional common ground in conversations. Depending on the measures used, studies have shown that emotional vocabulary and degree of understanding can vary among alexithymics. Furthermore, the development of Large Language Models (LLMs) has sparked debate regarding their capability for language understanding and whether natural understanding is always necessary. By linguistic definition (cf. Baggio, 2022; Bender et al., 2021), LLMs do not understand natural language but mimic it, using online data to become predictive models. AI systems are not sentient, and their biases and non-existent characters are based on human-generated information.

This paper advocates for the significance of collaboration for a species that depends on human attachment and connection, illuminating the benefits of respecting individual needs, understanding others, being understood, and avoiding harm. It can serve as a reminder that all aspects of life are subject to change, as *the diversity of human experience influences language comprehension in unique ways*. In closing, research into affective language is expected to continue due to the increasing interest in affectivism. This developing field has the potential to not only assist neurolinguistic research into the link between language and emotion but also other areas. In the context of the legal ruling, this field can enhance research into effective communication to promote psychological safety in the workplace and support legal proceedings in cases of verbal abuse.

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