15 Emotion and Emotion Concepts

Processing and Use in Monolingual and Bilingual Speakers

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1. Introduction

Recent work with monolingual and bilingual speakers has focused on the role of emotion in the encoding, storage, and retrieval of information and experiences. The current chapter explores the ways in which emotion processing – in the form of words, images, and other stimuli – differs across a bilingual’s two languages. Findings from the behavioural, physiological, neuroimaging, and clinical literatures support the notion of a bilingual’s first language (L1) garnering emotion processing advantages and preferences. As a set, these works are discussed with regards to language proficiency and experience, particularly the domains of language dominance and learning environments.

First, work with behavioural tasks has revealed the strength and durability of emotion concepts in the native language with regards to the activation of corresponding emotional words in memory, as compared to words in a second language (L2), and this effect is mitigated by word type: emotion word (e.g. love, joy) processing in L1 is facilitated to a greater extent than emotion-laden word (e.g. cancer, butterfly) processing. The behavioural section describes how these types of tasks can inform our understanding of emotional language and its representation, across a bilingual’s L1 and L2, with the relevant work indicating that emotional memories are tied to and influenced by the language of that experience. These connections are observed as bilingual participants reflect on their own memories, as well as when they respond to more implicit, experimental stimuli.

Physiological work and related findings from electrophysiological measures and neuroimaging have also shown similar L1 advantages, with faster, more dynamic responses and activity. Recent work has shown stronger physiological responses to
emotional expressions, words, and prose in a bilingual’s L1, showing the persistence of these effects across a wide range of stimuli. Neural data show similar patterns of greater, more widespread activity in L1, relative to L2. The more applied fields of clinical and counselling psychology have utilized findings from these domains to provide more complete treatment plans for their patients: offering translation services and flexible bilingual interviews, as well as managing a patient’s religious and cultural needs. The importance of this line of work cannot be overstated, given the growing bilingual population and the need for these specialized mental health services. As a set, these basic and applied approaches highlight the role of linguistic and cultural considerations in cognitive, biological, and clinical psychology.

2. Behavioural Work

Data from behavioural work on emotion processing typically stem from the fields of cognitive science and cognitive psychology with particular emphasis on the types of tasks and approaches that uncover language representation and processing. In this section, work that focuses on emotion word processing in L1 and L2 will be discussed as a function of the types of tasks and methodological approaches that have been readily applied, in this area of research (for additional discussions on word processing across languages, see Chapters 4, 18, and 19 in this volume). Work that investigates bilingual memory, attention, and emotion word processing, emotional Stroop tasks and bilingualism, and emotion’s influence on reading, word ratings, and lexical decisions will be reviewed. How do these methods and approaches help to inform what we know about emotional language, its mental representation and processing in L1 and L2? To begin with, emotional interactions and contexts help to form the way in which mental representations of emotional language develop in young children, as interactions between parents and children drive the development of this type of language and conceptual learning from a very early age (Chen et al. 2012). In their work, Chen et al. identified the ways in which the language chosen by parents to convey emotional expressions influences children’s emotional development. Parents tend to shift to L2 either to match the cultural expectations in the child’s surroundings, or to maintain emotional distance, possibly allowing for discussions without the arousal component that might come with discussing emotional events in the L1. By shifting language use at appropriate times during discourse that involves emotional topics, emotional understanding and emotion regulation can become refined and lead to better outcomes for children in terms of their social competence and their behavioural adjustment. By examining language shifts during emotional encounters, these authors were able to add to the literature regarding emotional adjustment and regulation for bilingual children. This is merely one example of how examining the representation and use of emotional language can help to enhance communication and promote overall well-being. Others include the deliberate use of L1 versus L2 in real-world decision-making, psychotherapy, marketing, and forensics (Altarriba and Kazanas 2017; Caldwell-Harris 2015; Costa and Dewaele 2012). In fact, the use of the L1 may provide distinct advantages over the L2, in cases where the arousal component might elicit more and richer facts related to a given situation, such as when
one is an eyewitness to a traumatic event (but see Pavlenko 2012). More will be said about these applied notions in Section 4.

The following section, Section 2, is divided into two main areas: (i) a review of theory and data regarding the encoding, storage, and retrieval of emotional words – basic information on emotion word representation; and (ii) a review of literature concerning word processing and comprehension. The first part includes a basic overview on how we distinguish, or otherwise characterize, emotional words and how they are coded in memory, as measured by time-sensitive presentation paradigms such as the rapid serial visual presentation (RSVP) technique, and the Stroop task. Both approaches are described in Section 2. Knowing a bit about how these words are coded or otherwise represented in memory, in both a first and a second language, the second part of this section examines how higher order processing occurs in terms of reviewing work focused on the processing, reading, and comprehension of emotional stimuli. Thus, the following sections move from issues of basic encoding and memory representation to the higher order cognitive processes involved in reading and word comprehension.

### 2.1. Emotion Word Acquisition, Storage, and Retrieval

It is said that language itself forms the glue by which individuals develop and use categories of knowledge including emotion categories in either language. Some argue that it is that very emotional vocabulary or emotional language that allows one to understand, perceive, and actually construct meaning when speaking with others or observing others using emotional language. This form of constructionism allows individuals to not only make sense of what they currently perceive in an interaction but to better predict the outcome of that interaction, particularly if it is emotional in nature (Lindquist et al. 2015). Thus, it is important to know exactly how emotion words and concepts are acquired, stored, and retrieved – information that is typically gathered via an examination of cognitive/behavioural data.

Work in the area of bilingual memory and attention has underscored the notion that memories are ‘tagged’ with language, such that part of the conceptual representations that are retained within a memory are typically encoded with the language in which it was experienced. In their seminal review, Holland and Kensinger (2010) underscore the notion that autobiographical memories contain information about specific, personal events, and that emotions are part of those memories influencing not only how they are encoded but also how they are retrieved. In fact, the emotional mode or context at the time of retrieval can influence the way in which memories are accessed and recalled. This notion can be expanded to the idea that those memories that are recalled are further influenced by the language in which they were both experienced and retrieved (Isurin 2017). It is quite clear from work on personal narratives, language discourse via cues or prompts, and the recording of mixed-language information that the very language in which emotional events were experienced influences the recollection of those memories and indeed, may even exert an influence on reconstructing memories from an earlier period in one’s life. Isurin notes that individuals who have undergone immigrations that were unplanned have particular remembrances from certain periods in their lives that are either richer due to using the L1 which was most active before immigration, or poorer when L2 may be used, a newly acquired language that was not active when the
memories were first encoded. It is quite likely the case that arousal and accompanying neural mechanisms also play a role in cementing memories that are activated from past, emotional events.

In terms of empirical, laboratory evidence, researchers have applied cognitive techniques in uncovering the ways in which L1 and L2 may differ in terms of emotional intensity. Ferré et al. (2010) tested Spanish-Catalan bilinguals’ memories for positive, negative, and neutral words. Participants were asked to assess the pleasantness of these words which appeared in either Spanish or Catalan. They then participated in a free recall task. Participants revealed better memory for the emotional words, as compared to the neutral words, in both of their languages. This was true both for this sample and for a sample of Spanish-English bilinguals who were exposed to the words in both languages though they had learned their L1 earlier in their lives than their L2. All in all, these groups of participants were highly proficient in both languages, and the authors argued that it was this proficiency that revealed no differences in their abilities to recall words in both languages. In other demonstrations in the literature, differences are detected, however, when indeed bilinguals are less than highly proficient in both languages, and/or when they have lived in an environment that is more biased, linguistically towards one or the other language (see e.g. Altarriba and Bauer 2004).

Using an RSVP technique, Colbeck and Bowers (2012) presented monolingual English, native speakers and bilingual, English-Chinese speakers with taboo words embedded within sets of neutral words. The participants’ task was to view the stream of words presented at a rate of one word every 100 milliseconds (ms) and then to report the colour word at the conclusion of each stream. Each stream contained taboo words, but participants were asked to ignore any emotion words and focus on the words that appeared in colour. The inclusion of the taboo words slowed processing of the colour words and hampered the ability to identify those words. Most interesting was the fact that for the English-Chinese bilinguals, taboo words in Chinese were less problematic than taboo words that appeared in L1 – English. Thus, there was an L2 advantage in the ability to recollect emotion words, highlighting the notion that the first language may store emotion words more strongly than the second language. That is, emotion words in L1 tend to capture attention more readily than emotion words in the L2.

Paradigms, such as the one above that capitalizes on an interference effect to determine how attention is directed by emotional stimuli, provide evidence to support the notion that emotion captures attention (see e.g. Altarriba and Basnight-Brown 2010, for work involving the affective Simon task). Another paradigm that also reveals this finding is the emotional Stroop task. In the standard Stroop task (Stroop 1935), a word is presented in a colour, and an individual is asked to name that colour as quickly and as accurately as possible, disregarding the word itself. For example, the word GREEN might appear in blue, thus, the response would be ‘blue’. Colour naming is disrupted in this case, the incongruent case, as compared to the situation in which the word and the colour are the same (e.g. the word GREEN appears in the colour green). In the case of emotion words, words such as happy or sad appear in coloured font, and the task is again, to name the colour of the word. Demonstrations of the emotional Stroop effect often include words in a neutral category (e.g. boat parts) that have been controlled in terms of frequency and length, as a comparison condition. Typically, emotion words
that appear in colour are responded to more slowly than emotionally neutral words. The emotional component of the words tends to capture attention and interfere with the participant’s ability to name its colour. Sutton et al. (2007) presented proficient Spanish-English bilinguals with emotion and neutral words in English and in Spanish and asked them to name the colour in which the words appeared. Interference effects were found in both languages for these participants, though the effects were numerically stronger in L2, where neutral words were responded to much more quickly than neutral items in L1. Thus, while these participants were highly proficient in both languages and showed a slowing in response times to emotional words in both languages, colour naming was indeed quicker for these participants for neutral words in L2 than in L1. This result likely stems from the fact that these participants were more practised readers of English, given that they had been in English-speaking schools for the greater part of their lives. Similar results have also been reported with late Finnish-English bilinguals (Eilola et al. 2007; however, see Winskel 2013 for a report of language differences for late Thai-English bilinguals as a function of language proficiency).

Researchers interested in how emotion affects memory processes have investigated what has been termed the emotional enhancement of memory (EEM) effect (see Hamann 2001, for a review). Studies examining the neurophysiology of emotion processing have underscored the important role of arousal and in particular, the amygdala, in playing a key role in driving explicit memory for positive and negative emotional stimuli. Plainly stated, emotional arousal can enhance memory in many situations, and can also impair memory particularly in cases where there are high levels of stress and cortisol release occurs to a certain extent. On occasion, it appears that this effect is stronger in the L1 – that is, memory for emotion words has been enhanced for bilinguals’ first language in unexpected tests of free recall for word lists and assorted memory tasks, as compared to the second language (see e.g. Anooshian and Hertel 1994; Baumeister et al. 2017). However, on occasion, the data suggest that L2 might display stronger EEM effects but only in situations where participants are asked to deeply process the emotional connotation of words or phrases in the L2 (see e.g. Ayçiçeği and Harris 2004). More will be said regarding the psychophysiological correlates of emotion processing, in Section 3.1.

2.2. Emotion Word Processing and Comprehension

Interestingly, while emotion words tend to lengthen response times for naming the colour in which they appear, recent reading research indicates that emotion words are read more quickly via the typical course of reading than are neutral words (Knickerbocker et al. 2015). English-speaking monolinguals were asked to read sentences that contained an emotion word, positive or negative, or a neutral word. The sentences were identical except for the inclusion of the emotional word or neutral word (e.g. Nora found her chair/passion about a year ago). Eye movements were measured using an Eyelink 1000 eye-tracking device. Readers processed the negative and positive words more quickly than the neutral words as evidenced by faster reading rates, first fixations, and total reading times. Thus, emotion words as processed in these monolingual participants actually sped up reading of typical sentences rather than posing interference. Thus, the combination of stimuli, language dominance, proficiency, and word type moderates eye
movements in reading. This work should be extended to include bilingual populations and multilingual readers in order to examine the ways in which reading in the two languages influences the record of eye movements, in these situations.

As mentioned in Section 2.1, having participants rate words for their attributes is another way that researchers have distinguished the representation of emotion words as compared to neutral words. Altarriba (2003) asked Spanish-English bilinguals to rate concrete (e.g. perro ‘dog’), abstract (e.g. mente ‘mind’), and emotion (e.g. feliz ‘happy’) Spanish words on one of three dimensions: concreteness, imageability, or context-availability. The concreteness scale included concrete and abstract anchors, and asked participants to rate words on this seven-point scale. Concrete words label an object that is tangible or perceptible. Words were also rated in terms of how easily a participant could think of an image representing the word – the imageability scale. Finally, the context-availability scale asks about the ease or difficulty of thinking of a context in which a word might be included (e.g. the title of a song or play, the title of a book, a commonly-used object). Emotion words were rated as less concrete but more easily pictured than abstract words. Interestingly, emotion words and abstract words in Spanish received equal ratings for context-availability. This finding was in direct contrast to earlier work in which emotion words in English were not rated as highly in terms of their context availability in English-speaking monolinguals (Altarriba et al. 1999). Altarriba concluded that emotion words are learned quite early in an L1 linguistic context that provides a complex learning environment for those words. Those emotion words are encoded more richly and deeply in terms of their semantic components, as compared to concrete words, and thus, context plays a large role in terms of the representation of L1 emotion words as compared to their L2 counterparts.

Finally, a task that has been applied to the investigation of emotion word representation in L1 and L2 for monolingual and bilingual speakers is the lexical decision task. In its simple form, this task asks participants to decide whether a word is a real word in a given language (e.g. box) or a nonword that is typically pronounceable in a given language (e.g. blit). Participants are asked to respond as quickly and as accurately as possible. Unbeknownst to the participant, there can be occasions where two successive words are related in some manner either semantically (e.g. cat-dog) or antonymically (e.g. day-night) or perhaps phonologically (e.g. lamp-damp). The first word or prime often facilitates responses to the second word or target indicating that there is a relationship between the two words in the mental lexicon. Primes and targets can be words, pictures, objects or take other forms. Lindquist et al. (2006) found that presenting emotion words as primes (e.g. anger) and setting up a situation in which the emotion word was satiated produced a slowing down of responses to faces depicting that emotion. That is, once an emotion has been activated and primed to a given extent, it then makes it more difficult to identify that emotion in the faces of others. These kinds of demonstrations are important in the understanding of emotion perception particularly when it involves a human face. In cases that do not involve the satiation of emotion, it has been shown, however, that response times are faster when facial posture matches the valence of a subsequent sentence than in the case in which they mismatch (Havas et al. 2007). Thus, emotion comprehension can affect both the perception of faces, as well as, the comprehension of language in the form of sentence reading.
Altarriba and Bauer (2004) were the first to discuss the ways in which emotion words prime each other, but often fail to prime other classes of words, namely, abstract words. When emotion words appear as primes and targets and are semantically related to one another, they tend to show facilitation in lexical decision times as compared to cases in which two emotion words are not semantically related – a semantic priming effect. Abstract words also tend to prime related emotion words; however, the reverse is not the case. The authors discuss these findings in terms of the ‘fan effect’ in which emotion words have a larger number of related or associated items making it difficult for any single (abstract) item to receive the level of activation needed to show a priming effect. In this way, emotion words were shown to be readily distinguishable from abstract words. Kazanas and Altarriba (2016) demonstrated that emotion words elicited faster reaction times in a lexical decision task as compared to emotion-laden words (e.g. words like cancer or death that are emotional but do not name an emotion state). This effect occurred only in English, however, for Spanish-English bilinguals, indicating that emotion words were more deeply coded in the L2 for these bilinguals, at first appearing to contradict earlier reports of stronger emotionality in L1 versus L2. In fact, in this study, even though the bilinguals learned English later in life, L2 became the more dominant language and the language that was practised more readily by these participants in both spoken and written form. Degner et al. (2012) also reported significant affective priming for participants in their dominant language (in this case, their L1, German) and reported similar findings in L2, French, but only where there were high levels of immersion and the frequency of the words in that language was high, as well. Thus, it is the case that dominance is not always equated with ‘first language learned’ for bilingual populations, particularly in the United States. Context seems to serve a moderating role beyond linguistic proficiency, in these types of paradigms. These findings – reflecting the differences between early and late bilingualism – replicate across behavioural, psychophysiological, and neuroimaging work, with additional implications for clinical settings.

In summary, the current section introduced notions regarding the benefits that can accrue by switching languages between L1 and L2 when processing emotional stimuli. The typical findings indicate that while L2 might be used to distance oneself from the arousal or intensity that co-occurs with the processing of emotional language, this is only the case when L2 is the subordinate or later-learned language. Knowing the interplay between languages and emotion in bilingual speakers can help inform a variety of real-life situations in applied settings, some of which will be explored towards the end of the current work. Additionally, the present section reviewed the ways in which emotion words are coded or characterized in our mental representations in terms of imageability, concreteness, and the like, noting that tests that capitalize on interference effects (e.g. RSVP paradigms; Stroop tasks) help to uncover situations in which L1 or L2 is the language in which emotions are deeply coded for a bilingual speaker. Most important, emotions are tagged in the language in which they are situated such that L1 might be rendered the most ‘emotional language’ if indeed emotions were learned, reinforced, and coded when L1 was the active or current language, in the bilingual’s learning experience. If L2 words are newly coded and not deeply situated in memory, they may in fact show less interference in Stroop tasks or related tasks as they have yet to garner all of the intensity and arousal components of the more proficient L1.
3. Psychophysiological and Neuroimaging Work

Recently, researchers have begun to pair behavioural tasks with physiological and neuroimaging methods, using various equipment to examine differences in emotional experiences across a bilingual’s L1 and L2 (for related discussions on bilingualism using these technologies and equipment, see Chapters 2, 9, and 14 in this volume). For example, the behavioural tasks discussed previously – reading, Stroop, lexical decision, rating, and so on – have been paired with equipment to measure bilingual’s facial expressivity, skin conductance, electrophysiology, and neural activity. This section discusses these collaborative efforts, as well as more unique endeavours, again highlighting the ways in which emotion processing and expression in a bilingual’s L1 compares with their L2. As was the case with behavioural data, differences in emotion processing are often a function of language experience.

3.1. Psychophysiological Work

One common finding across physiological works is greater expression and activity when bilinguals activate and process emotional information in their L1, relative to their L2. Common measures in these lines of investigation include facial electromyography (EMG) and skin conductance responses (SCRs), distinguished by their ability to discriminate the nature of emotional experiences and stimuli: In many ways, EMG is better suited for measuring differences in valence, while SCRs are better suited for measuring levels of arousal (e.g. Bradley and Lang 2000; Lang et al. 1993, 1998). In one recent example, Foroni (2015) assessed facial muscle activity when Dutch-English bilinguals read sentences that contained verbal descriptions of emotional expressions (e.g. I am smiling; I am not grinning). In part, these kinds of investigations allow researchers to also examine whether L1 processing engages the motor cortex to a greater extent than a bilingual’s L2. In an interesting finding, both sentence form and language affected muscle simulation (L1 Dutch results described by Foroni and Semin 2013). With affirmative sentences, participants displayed similar reactions in their L1 and L2; reading sentences such as, I am smiling led to participants activating the zygomatic major muscle. However, with negative sentences, similar reactions were not observed across L1 and L2. When presented with I am not grinning in a bilingual’s L1, Foroni and Semin (2013) observed relaxation and inhibition (i.e. relaxed zygomatic muscles); these effects were not observed in their L2 (Foroni 2015). Overall, smaller reactions in L2 were likened to partial, or weaker simulations: Emotional language processing in L1 likely relies on simulations of meaning, as described in the emotional expressions. The somatic correlates of these expressions are weaker in a bilingual’s L2, the result of weaker semantic connections (Foroni 2015; Foroni and Semin 2013).

Researchers have also paired facial EMG with other behavioural tasks. Recently, Baumeister et al. (2017) examined facial muscle activity when Spanish-English and English-Spanish bilinguals performed categorization and recognition tasks. In the categorization task, participants categorized words according to whether they were associated or not associated with emotion, with words including those related to happiness and anger. Replicating patterns of behavioural data discussed in Section 2, participants
categorized more effectively in their L1, which Baumeister et al. indicated was not a reflection of their word fluency. These behavioural data were supported by increased facial responsiveness in their L1, in both the zygomatic and corrugator muscles. Moreover, SCRs, a measure of autonomic arousal, were stronger for emotion words in L1, with no differences between emotion and neutral word processing in L2. These patterns were also replicated with recognition data, collected 24 hours later. Together, these findings indicate reduced activity and general differences from an embodiment perspective, suggesting that emotion processing in a bilingual’s L1 is grounded in embodied simulations: how emotions are experienced and learned during childhood will differ from the L2 learning environment.

Caldwell-Harris and colleagues (Caldwell-Harris and Ayçiçeği-Dinn 2009; Harris et al. 2003, 2006) have adopted a similar hypothesis, arguing that the emotional context of L1 learning is met with an earlier age of acquisition and generally greater proficiency, the consequence of interpersonal and motivating learning environments with family members and friends. Their SCR data largely support an L1 advantage, with higher SCRs for emotional information presented in a bilingual’s L1, relative to their L2. In many of their early investigations, bilinguals rated a variety of emotional words and phrases: insults, reprimands, taboo words, endearments, and so on. SCRs were often correlated with ratings, with more negative phrases (e.g. reprimands) prompting higher SCR amplitudes and unpleasantness ratings (Harris et al. 2003). Some participants also remarked that the auditory presentation led them to remember hearing a family member speaking those reprimands (p. 573). Similar findings were observed with late Spanish-English bilinguals displaying heightened sensitivity to reprimands presented in Spanish (Harris 2004). This pattern of data has also been observed with other samples of late Turkish-English bilinguals who had learned English in intensive educational settings and self-reported their English proficiency as ‘fair’ or ‘good’ (Caldwell-Harris and Ayçiçeği-Dinn 2009). Lending further support for the emotional contexts of learning hypothesis, this difference in sensitivity across languages is not often observed with early bilinguals, such as those participants whose L1 and L2 learning environments were well-matched. Moreover, Harris (2004) reported comparable SCRs for L1 and L2 taboo words amongst these early bilinguals. Thus, observed differences in emotional reactivity with these measures is often a function of the language learning experience and environment.

As a result, these physiological investigations often depict L2 emotion processing as less extreme, with bilinguals experiencing fewer or reduced physiological responses, relative to L1 emotion processing (Eilola and Havelka 2010). One recent exception to this pattern compared SCRs for words rated for their emotional intensity. Sampling Chinese-English bilinguals, Caldwell-Harris et al. (2010) identified cultural constraints that affect emotion expression. Many of their late learners preferred English for expressing anger and intimacy, challenging the findings discussed previously with other bilingual samples. Moreover, increases in SCR amplitudes for English endearments were observed with bilinguals who reported high Chinese usage. For these bilinguals, whose language experiences resemble those sampled in other studies, the role of culture adds a new layer of complexity. In many ways, the English language permits them to be more emotionally expressive than their L1 Chinese, with this freedom
observed in their preference ratings and SCR data. Again, these multimethod investigations are particularly useful for clarifying the specific nature of L1 and L2 differences.

### 3.2. Electrophysiological Work

Other measures of sensitivity include those that can be gleaned from event-related potentials (ERPs) using electroencephalogram (EEG) recordings. These data provide unique insights across the timecourse of cognitive processes, including the automatic, early access of emotional information in a bilingual’s L1 and the more delayed access to their L2. With these ERP investigations, common findings include an early component – the early posterior negativity (EPN) – detected at left temporo-occipital electrode sites, believed to indicate the spontaneous activation of a word’s emotional connotation. With late bilinguals, this ERP component is delayed when emotional stimuli are presented in their L2. Conrad et al. (2011) detected this delayed EPN with late Spanish-German and German-Spanish bilinguals, who performed a lexical decision task (LDT) with positive, negative, and neutral words. The EPN was delayed 50–100 ms during L2 processing, for both groups of bilingual participants. Interestingly, overall ERP effects were stronger for negative words than for positive words in German (in both L1 and L2), yet stronger for positive words than for negative words in Spanish (also in both L1 and L2), highlighting the important consideration of language-specific findings in these paradigms. Of equal importance, additional investigations have shown that the durability of these differences in emotion activation do not appear to be confounded by proficiency, frequency of use, or other relevant multilingual factors (Opitz and Degner 2012).

A bit later in the timecourse of emotion word processing, another ERP component can distinguish L1 from L2 processing. A negative wave peaking approximately 400 ms poststimulus onset (N400) can be detected across centro-parietal electrode sites. The N400 is thought to be modulated by several linguistic functions. One of these, semantic integration, can be observed in tasks that ask participants to process competing information, as is the case with variants of the Stroop (1935) task. In one of these, Fan et al. (2016) presented late Chinese-English bilinguals with emotion words superimposed on faces, creating a set of congruent (happy presented with a happy face) and incongruent (happy presented with an angry face) trials. This conflict-related N400, activated by competing emotional information, was met with congruency effects only in a bilingual’s L1. Thus, the interference is more readily apparent in L1, as more attention is given to emotional information in conflict. Another function of the N400 appears to be related to affective valence. For example, Jończyk et al. (2016) presented a number of emotional sentences with congruent and incongruent endings to a sample of late Polish-English bilinguals. The N400 component was enhanced by Polish sentences as compared to English sentences – replicating the L1 advantage for processing emotional information – and this was particularly the case for negative sentences (e.g. Gloria accidentally poured boiling water over herself and was burnt). These data suggest that late bilinguals can experience their L2 in an incomplete, shallow manner, with especially limited access to the complex connotations of negative words. These effects are visible with methodology that tap the early timecourse of word processing (ERPs) as well as those that permit slower, more effortful emotion processing (SCRs).
3.3. Neuroimaging and Related Work

Data displaying neural activity – the structures and coordination in emotion processing – are not quite as cohesive. While some studies do imply an L1 advantage, with increased activity in brain regions when processing emotional information in L1 (e.g. Hernandez 2009; Hsu et al. 2015), others show similar patterns of activation when processing emotional information in L1 and L2 (e.g. Yang et al. 2017), or different patterns of activity altogether (e.g. Chen et al. 2015). These mixed findings are early in terms of their recent publication and rapid advances in technology, though they highlight the need for further research in this area: sampling new populations of bilinguals with a wide array of emotional materials.

Neuroimaging studies examining emotion processing often depict activity in the amygdala, regardless of positive or negative valence (Garavan et al. 2001; Hamann and Mao 2002; Hamann et al. 2002), as well as generally greater interhemispheric communication when processing emotional information (even in a bilingual’s L2; Jończyk 2015). Interestingly, data collected by Hernandez (2009) using functional magnetic resonance imaging (fMRI) has shown increased activity in a number of brain regions – including the amygdala – even when participants process neutral information. In his study, early Spanish-English bilinguals performed a picture-naming task, with language-naming instructions mixed or blocked. Importantly, words included fruit and furniture exemplars, which score in the neutral range on a number of emotion dimensions (e.g. arousal, valence). Thus, amygdala activity, heightened during Spanish trials, suggests that a bilingual’s L1 may benefit from more widespread neural activity. Moreover, these data lend support to the notion that a bilingual’s L1 may be more generally emotional (at least, in a visual form), relative to their L2. This seems to be the case even when bilinguals have a great deal of experience with each language, as was the case with Hernandez’s (2009) early bilinguals, who reported an average L2 age of acquisition of five years old.

General L1 advantages appear in other brain regions, as well. Using excerpts from J. K. Rowling’s Harry Potter novels, Hsu et al. (2015) had late German-English bilinguals provide emotion ratings on valence, arousal, fearfulness, and happiness dimensions to positive, negative, and neutral passages. Ratings were consistent with fMRI data, with differences in valence, fear, and happiness ratings across L1 and L2, along with greater L1 activity in the bilateral visual cortices (a possible explanation for the data reported by Hernandez 2009), left precentral gyrus, and amygdala. In many cases, these patterns of increased L1 activity were observed across all passages, in other cases, increased activity was restricted to the emotional passages.

Other fMRI data refute some of these general increases in neural activity during L1 processing, suggesting qualitative differences in L1 and L2 emotion processing. In one recent example, Chen et al. (2015) had late Chinese-English bilinguals perform a variety of lexical and executive function tasks (the LDT, operation span (OSPA), and Simon tasks) with positive, negative, and neutral words while simultaneously collecting ERP and fMRI data. Regions activated during emotion word processing included the left superior frontal gyrus, middle occipital gyrus, and left cerebellum, while the superior parietal lobe had greater activation for neutral word processing, relative to positive and negative word processing. Of these regions, several patterns of activation differed across
L1 and L2 processing. In the middle occipital gyrus, negative and neutral words in the bilingual’s L1 produced greater activation than positive words, with no response detected for emotion words in their L2. Additional differences were observed in the left cerebellum, with opposite patterns detected across L1 and L2: positive words produced weaker activation than neutral words in their L1 and greater activation than neutral words in their L2. Again, these data suggest some general differences in emotion processing across L1 and L2. However, some recent work with computational modelling has suggested that neural activity collected from 38 brain regions when reading in one language – including sentences pertaining to people, places, actions, and feelings – can also predict neural activity for sentence-reading in another language. Yang et al. (2017) found that neural activity collected during English reading was largely similar to reading in Portuguese amongst Portuguese monolinguals and Portuguese-English bilinguals. Findings from these predictive models are important, though tentative given the need for simple, concrete sentences that are well-matched across sentence types (e.g. *The family was happy*; *The street was dark*).

Findings from psychophysiological and neuroimaging work – with data measuring facial muscle activity, skin conductance, event-related potentials, and neural activity – largely support an L1 advantage in emotion processing. The advantage appears in many forms: greater physiological reactivity, earlier electrophysiological activity in the brain, and so on. Many of these findings, however, rely on data collected with late bilinguals: sampling participants whose language-learning experience greatly differs across their two languages (i.e. differences in terms of age of acquisition; Caldwell-Harris and Ayçiçeği-Dinn 2009; Harris et al. 2003, 2006; differences in terms of culture; Caldwell-Harris et al. 2010). Despite these limitations, the L1 advantage does persist across this wide variety of measures and experimental stimuli, including words (Baumeister et al. 2017; Chen et al. 2015; Conrad et al. 2011; Harris 2004), pictures (Fan et al. 2016; Hernandez 2009), sentences (Foroni 2015; Foroni and Semin 2013; Jończyk et al. 2016), and prose passages (Hsu et al. 2015). Real-world applications of these L1 and L2 comparisons follow in Section 4, with an emphasis on the preferred language in emotional settings.

4. **Applied Work in Clinical and Counselling Settings**

Laboratory and applied research findings derived from behavioural, psychophysiological, and neuroimaging studies have been utilized in clinical and counselling settings to improve mental health services for bilingual individuals (see also Chapter 31 in this volume). This section elaborates on the intricacies involved when working with bilingual clients, and differences in cognition and expression of emotion between L1 and L2 usage; the impact interpreters can have on healthcare outcomes; and culture-specific treatment strategies.

4.1. **Research Findings and Implications for Practice**

Research shows that language is a primary means through which emotions are labelled and expressed (Altarriba et al. 1999), and a client’s native language is often the one that is considered more emotional (Altarriba 2003; Santiago-Rivera and Altarriba 2002).
Since bilingual speakers periodically use more than one language to identify and convey their emotions, providing bilingual therapy poses a unique and intricate challenge (Bager-Charleson et al. 2017; Rolland et al. 2017).

De Zulueta (2006) acknowledged that language has an intrinsic link to our sense of identity, and using different languages is associated with experiencing changes in self-image (Pavlenko 2006). The research establishes that individuals tend to represent emotion words differently in their two languages and typically associate these words with a broader range of emotion in their L1 (Altarriba and Santiago-Rivera 1994). Various experimental studies assert that autobiographical recall differs depending on whether the language of encoding is congruent with the one of retrieval (Altarriba 2002, 2006; Altarriba and Canary 2004; Marian and Neisser 2000; Schrauf 2003; Schrauf and Durazo-Arvizu 2006). Since recalling memories in the encoding language is shown to increase detail and emotional intensity, clinicians are challenged to obtain the most accurate information possible from their bilingual clients (Byford 2015; Harris et al. 2006; Marian and Neisser 2000).

Bilingual speakers can employ a technique known as code switching, which occurs when a speaker substitutes a word or phrase in a single language with a counterpart in another (Bhatia and Ritchie 1996; Heredia and Altarriba 2001; MacSwan 2013). Fortunately, code switching appears to offer a plausible strategy for bilingual therapists and their clients to use during therapy (Dewaele and Costa 2013). Potential explanations for code switching by bilinguals include wanting to express themselves more accurately and to be better understood (Altarriba 2003; Grosjean 2010), non-equivalence between language concepts (Wierzbicka 1997), and an occasional lack of word-to-word translation across languages (Altarriba 2003; Basnight-Brown and Altarriba 2016).

Evidence suggests that bilinguals can use a less dominant language to serve as a distancing function for discussing troubling events (Altarriba 2008; Pérez Foster 1998; Pitta et al. 1978), which Marcos (1976) named the ‘detachment effect’ (see also Pavlenko 2012). Ideally, a skilled therapist would be able to assess the situation and lead the patient to switch languages in a way that best allows for memories and emotions to be accessed (Santiago-Rivera and Altarriba 2002). Therapists have demonstrated shifting languages as a strategy to build the therapeutic alliance by bonding with their clients, intentionally managing resistance and engagement in the therapeutic process, facilitating disclosure and expression of emotions, and improving communication and understanding (Sprowls 2002). Although code switching presents a potentially valuable therapeutic technique, many bilingual therapists have had to informally train themselves due to a lack of formal training specifically for providing bilingual therapy (Verdinelli and Biever 2009; a recent review of the neurorehabilitation literature strongly recommends additional training for bilingual clients, Altarriba and Kazanas 2017).

Processing emotion language in L1 and L2 can have significant implications in a range of domains, such as confrontation and decision-making. Caldwell-Harris and Ayçiçeği-Dinn (2009) demonstrated that participants report more affective discomfort in L1 than L2 when lying, which implies that a lack of emotionality in L2 can promote suspects to lie and make false confessions when being interrogated in that language. In contrast, Keysar et al. (2012) have identified that fewer decision-making biases are an advantage provided by lower emotional expression in L2 than L1 (see also Costa et al. 2014).
Since bilingual speakers pose a challenge to therapists, sufficient knowledge and understanding of bilingual cognition and emotional expression is imperative for providing effective treatment. Improving access to formal training for clinicians interested in serving bilingual speakers is essential in locations with increasing bilingual populations.

4.2. Use of Interpreters in Clinical Settings

Without interpreters, effective communication between some clinicians and their patients is a difficult obstacle to overcome. When a clinician and their patient do not share a language, using an interpreter is often the most convenient solution to this problem. However, this strategy comes with a multitude of potential benefits and pitfalls.

Many providers expect interpreters to serve in a neutral conduit role, in which information is transferred from one language to another in a word-for-word, machine-like fashion (Brämberg and Sandman 2013; Fatahi et al. 2008; Rosenberg et al. 2007). By serving in this role, it is standard for the interpreter to emulate the affective state of the patient when relaying information to the clinician, rather than their own (Hsieh 2009). Having an interpreter communicate the emotional expressions and affective content of the client can help ensure favourable provider–patient interactions (Avery 2001; Farini 2013).

Not only can interpreters bridge language gaps, but they may also ease the therapeutic process by providing insight regarding the patient’s culture and values to the clinician. Moreover, positive side interactions with the interpreter may allow clients to feel more comfortable about revealing sensitive information to their provider (Penn and Watermeyer 2012). Interpreters can also increase comfort in therapy by reaching out to the patient and other community members with the intent to break cultural barriers. Research investigating the impact and role of interpreters in diagnostic interviews describes clinicians reporting high confidence in their assessments due to interpreters providing unbiased, accurate information (Zayas et al. 2007).

Despite the potentially positive aspects of using an interpreter, there are some issues regarding their influence on adverse healthcare outcomes. First, there is concern that a patient’s beliefs, experiences, and emotions may be distorted or lost during interpretation (Singh 2016). Second, without the adequate clinical knowledge and cross-cultural training, an interpreter may inadvertently heighten, minimize, or overlook a patient’s or a provider’s emotions and emotion work (i.e. emotional management; Hsieh and Nicodemus 2015). Third, the use of an interpreter can often interfere with the therapeutic engagement, not only in the areas of gender, age, religion, cultural, and hierarchical values but also in the discussion of sensitive issues (Nijad 2003). Fourth, Vasquez and Javier (1991) pointed out that interpreters have been found to potentially jeopardize the treatment process by gaining a sense of power in their position, attempting to take on the role of the therapist, and interjecting their own opinions about diagnoses and treatment. Finally, since formally trained mental health interpreters are scarce and patients have a right to an interpreter of their choice (i.e. refusing the one provided) clinicians may face the ethical tension between respect for patient autonomy and their commitment to non-maleficence and beneficence (Searight and Searight 2009). Furthermore, interpreters from collectivist cultures that de-emphasize autonomy may
possess a worldview emphasizing family or collectively held information, which poses a confidentiality risk (Searight and Gafford 2005; Sue and Sue 1987). Ultimately, it is the clinician’s responsibility to ensure that the interpreter demonstrates competence to provide services while also protecting patient confidentiality and avoiding dual relationships (APA 2017).

Researchers have noted that there is a growing demand for interpreters with formal training to assist clinicians providing therapy, but such interpreters are in short supply. Musser-Granski and Carrillo (1997) have suggested that areas of focus for training and educating interpreters in the United States should include the following: (i) English language and American culture; (ii) mental health terminology, concepts, and interventions; (iii) interpretation of words and affect; (iv) crisis intervention; (v) interviewing techniques; and (vi) beginning counselling skills. Paone and Malott (2008) recommended that before conducting a therapy session, counsellors and interpreters ought to have a discussion to agree on specific practices, goals of the appointment, and potentially challenging topics; ideally, they should also rehearse before the session begins. Although the use of interpreters in therapy can be advantageous, further research and practice must orient towards improving therapeutic engagement and communication with bilingual and bicultural patients.

### 4.3. Cultural Issues and Culture-Specific Treatment Strategies

It is necessary to understand the impact that cultural background has on a person’s emotional expression and sense of identity. To illustrate, research on cultural differences in emotional expression has found that individualist and collectivist cultures differ significantly on the acceptance of emotional expression, with individualist cultures having higher expressivity norms (Matsumoto et al. 2008). Consideration of cultural factors in therapy with bilingual and bicultural populations is crucial to increasing the quality of treatment and decreasing dropout rates (Flaskerud 1986).

Unfortunately, minority populations have been found to underutilize mental health services and have a higher rate of termination of treatment than white Americans (Nadeem et al. 2007; Sue et al. 2009). Negative attitudes and stereotypes concerning mental illness are prevalent amongst ethnic-minority populations, and in family-centred cultures, psychological issues are typically not discussed outside the family (Gary 2005). When these individuals have difficulty, they are expected to turn to clergy, family members, elders, family doctors, or religion/spirituality (Martinovic and Altarriba 2013). Consequently, members of family-centred cultures tend to only seek help outside the family as a last resort (Willerton et al. 2008).

Discrimination, language barriers, acculturation, and poverty are some of the common impediments that contribute to higher rates of mental illness than in other clients (Anderson 1983; Maduro 1983; Muecke 1983; Sue and Morishima 1982). As compared with people born in the United States, individuals with low acculturation and limited English proficiency were only half as likely to seek mental health care (Snowden et al. 2007). The disparity between these groups emphasizes how language and culture are barriers that continue to deter minorities from utilizing mental health services.
To improve treatment for minority groups, some researchers have directed their focus towards refining education and training for multicultural counsellors. Sue et al. (1992) suggested that therapists interested in becoming culturally skilled ought to receive training in traditional assessment techniques and attain awareness of their stereotypes and those of other cultural, racial, and ethnic groups. Recommendations also include acquiring the latest research knowledge and skills related to the following areas: (i) ethnic and cultural groups; (ii) religious/spiritual beliefs and family structure of the groups under consideration; and (iii) sociopolitical structures and institutions surrounding a given client (Sue et al. 1992). Additionally, language match between a therapist and their client has been associated with a lower dropout rate and an increased length of treatment (Willerton et al. 2008). Thus, therapists are encouraged to assess and match languages with their patients whenever possible (Andrés-Hyman et al. 2006; Sue et al. 1992).

Intriguingly, researchers have also found that patients often resist points made directly (Barker 1985). Littmann (1985) suggested metaphors can be used to reach an emotional part of an individual that may be too adamantly defended to be otherwise accessible. Moreover, using culturally preferred terms to discuss psychological issues can help increase rapport with the client by reflecting an understanding of their distress, while avoiding the stigma sometimes associated with mental illness (Snowden et al. 2007; Willerton et al. 2008).

It is evident that obstacles such as discrimination, language barriers, cultural differences, socioeconomic factors, and stigmas associated with mental illness can negatively influence healthcare outcomes for people belonging to various cultural, racial, or ethnic groups. To counter such hindrances, training clinicians to become culturally skilled is vital for increasing the quality and utilization of mental health services amongst bilingual and bicultural individuals.

5. Conclusions and Recommendations for Future Research

Emotion work conducted with bilingual individuals has offered valuable theoretical and applied insights. Recent work has shown that late bilinguals do prefer the language they had acquired early in life; during emotional situations they rely on that language in a range of everyday and clinical settings. These preferences are supported by behavioural and physiological differences in emotion processing across a bilingual’s two languages: faster, more accurate emotion activation, more durable emotional memories, and more dynamic reactivity and neural activation, most often in their L1. L2 responses are often slower and more effortful during behavioural tasks, with weaker physiological responses and patterns of electrophysiological and neural activity. While these methods are varied in their focus and purpose, they draw similar conclusions in L1 dominance for emotion processing. The exceptions to these observations are few, though important. For one, matching proficiency across a bilingual’s languages can minimize or even eliminate word processing differences (Ferré et al. 2010). These balanced bilinguals – and also those bilinguals whose L2 has become their more dominant language – are not as likely to show L1 advantages.
Future work, primarily in the applied literature, would greatly benefit from understanding how behavioural and physiological differences translate into differences in a bilingual’s emotional experiences and expressions. The implications for bilingual therapy and its training, particularly a flexible, bilingual mode of therapy are of the utmost importance in these investigations. Permitting this bilingual mode of therapy is particularly important in preserving the accuracy of a bilingual speaker’s emotional expressions, minimizing translation and interpretation difficulty, and promoting cultural understanding in these settings.

Finally, we recommend future research adopt a multimethod approach to investigate these differences in emotion processing: our understanding of current findings is overwhelmingly (with few exceptions) limited to single-method approaches with a single bilingual sample. Future research would largely benefit from more broad examinations of emotion effects in laboratory and applied settings, adding a range of stimuli, equipment, tasks, and language experience.

REFERENCES


automaticity of affective connotations of first and second language words.  


Neural Representations


