Department of Education, University of Oxford

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Exploring the relationship between code-switching and emotions.

A systematic review.

Abstract

This systematic review aims to assess the interaction of code-switching (CS) and emotions, and how this relationship may be influenced by cross-cultural and cross-modality differences. The link between language preference and emotions has long been discussed, yet an overview on factors within and underlying the association is still lacking. As such, there is a critical need for a systematic evaluation of the interaction of CS and emotions. An initial search in four databases resulted in 1944 papers, which were then screened by 6 inclusion criteria. A total of 19 studies within the last 10 years were identified, with the majority of studies based in Asian contexts, and English as the most common second language. The overall risk of bias of included studies was moderate-to-high, and the key issue was the ambiguity of data collection. Narrative synthesis of selected studies showed that CS and emotions interacted with each other both in intrapersonal and interpersonal perspectives. People tended to switch their code when feeling emotional. CS was also applied for several affection functions, especially in expressing, negotiating, and managing emotions. Intensive, abrupt, and negatively charged emotions were often linked to CS, with anger being identified most frequently. This interaction could probably be either conscious or unintentional. Compared to people from western cultures, people originally from Asia were found applying CS uniquely for emotional support. No salient cross-modality difference was found. Overall, results of reviewed studies were consistent. Emotions could influence the occurrence of CS and CS was also employed for emotional functions. This interaction is influenced by personal language experiences that shaped by their social and cultural backgrounds. Further studies on other cross-linguistic and cross-cultural differences are suggested to build up the interaction to a broader context.

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List of Abbreviations

CS	Code-switching
EFL	English as Foreign Language
IDESR	International Database of Education Systematic Reviews
L1/L2	First/Second Language
LX(s)	Additional language(s)
MMAT	Mixed Methods Appraisal Tool
PRISMA	Preferred Reporting Items of Systematic reviews and Meta-Analyses
RoB	Risk of bias
SCR	Skin Conductance Response

Chapter 1. Introduction

Multilingualism is a trend rapidly developing worldwide. Approximately half of the world population using more than one language and the number is still growing (Grosjean, 2013). In the United States (US), 67.8 million people (nearly 20% of the population) speak languages other than English at home (US census bureau, 2019). Similarly in the United Kingdom (UK), 1.6 million children (nearly 20%) also have their first language (L1) as one other than English (UK Department for Education, 2021). As such, more attentions had been given to the multilingual population, and many unique multilingual behaviours have been identified. Code-switching (CS) is one prevailing linguistic behaviour among this population. People may switch their languages within a conversation for various purposes, such as to express emotions (Gumperz, 1982). Meanwhile, the onset of producing alternative codes is also influenced by different factors, and one of the key factors is emotion (Dewaele, 2010a). This interaction of CS and emotions is the focus of this study.

To discuss the association of code-switching and emotions, it is necessary to understand theories of emotions and illustrate how language and emotions interact with each other. Although the definitions and assessments of emotions are still in debate, most scholars agree that emotion is a mental state within cognition (Cabanac, 2002), which is associated with embodied experiences and is influenced by social interactions (Pavlenko, 2012). As emotions are inner states and cannot be assessed directly, researchers then initiate different approaches to operationalize emotions. Some researchers tend to categorize emotions by physiological aspects (Ekman, 1992), while others focused on the psycholinguistic perspective and propose that emotions cannot be operated without the formation of emotion concepts (Lindquist and Barrett, 2008). These concepts are constructed by individual experiences and are established through language acquisition (Barrett, 2016). According to the latter theory, language experience is essential in developing emotions and affective functions, and emotion lexicon could then be applied to assess these functions. Consequently, acquiring an additional language may change the encoding and decoding processes of emotions (Pavlenko, 2008) and result in

multilinguals' special behaviours regarding emotions.

Previous studies have noticed that multilingual people have different experiences when using their two or more languages (Lieberman, 2007). They normally associate stronger emotions with their L1 and less emotions with their second or additional languages (L2/LX) (Pavlenko, 2008). This difference in language emotionality, however, not necessarily lead to a preference of using L1 for expressing emotions. In fact, recent studies found that people not necessarily assign higher emotionality to their L1 (Dewaele, 2010b), and they may switch to either L1 or LXs to express emotions (Dewaele, 2010a). Moreover, CS was also found being employed for other affective purposes. On the other hand, research on emotions and cognition identified that emotions is also a factor influencing language production (Hinojosa, 2010). The association of CS and emotions is not one direction and it is more complex and dynamic. They interact with each other, and the interaction is influenced by various factors.

1.1 Rationale and objectives

The close association of language and emotions suggests that acquiring an additional language may influence how people operate emotions. Research on multilinguals' emotion construction found that people have unbalanced emotionality in their languages and their application of language in affective events was influenced by multiple factors. Nonetheless, no research to my knowledge has provided an overview of these influencing factors on the interaction of CS and emotions. Meanwhile, research in this area is also restricted by the complexity of cross-linguistics and cross-modality differences. Therefore, this study adopts a systematic review approach to explore factors within and underlying the interaction of CS and emotions. By assessing relevant studies that have been conducted within the last 10 years across the global, this review will summarize affective functions of CS and emotional effect on the onset of CS, and identify any cross-cultural/linguistic and cross-modality effects on the interaction.

1.2 Outlines

This review has another four chapters. Chapter 2 will give further details of emotion theories and how language is associated with emotions. Definitions and functions of CS will be discussed and previous studies on the interaction of CS and emotions will be briefly introduced. Chapter 3 will outline the methodology and design of the review. Chapter 4 will provide summaries and details of findings from the identified studies. Chapter 5 will discuss these findings, the limitation of the review, and give suggestions on further studies.

Chapter 2. Literature review

2.1 Language and emotion

2.1.1 Definitions and theories of emotions

Research on language and emotions has long been discussed and could be traced back to the definition of emotions (Ladegaard, 2018). While there is no consensus on what emotion is, most scholars agree that emotions are dynamic reactive mental states (Cabanac, 2002) and are embedded in social interactions and relationships (Parkinson and Manstead, 2015). Since emotion is an obscure concept, scholars have proposed different theories to operationalize emotions. In 1992, Paul Ekman initiated the Basic Emotion hypothesis, saying that people are born with discrete emotions, like joy, sadness, anger, fear, surprise, and disgust. He categorised emotions based on physical behaviours, more specifically, facial muscle movements, and suggests that all infants would innately present similar facial expressions. For instance, joyful face to tasty food or sadful disgust face to a bad smell. Cross-cultural experiments on people from different ethnicities also suggested that some facial muscle movements could be recognized universally (Ekman, 1992; Sauter et al., 2010). Meanwhile, he argued that nerve systems show distinctive patterns for different emotions (1992), confirming the physiological basis of emotions. Ekman further supported his hypothesis by comparing observations in other primates. He found that these primates exhibited similar facial muscle movements to humans, which suggested that emotions may be the product of evolution (Ekman, 1992). Therefore, he concluded that emotions are physiologically different from each other, they are inherited by human and are universal in nature. While those categorical emotion labels for facial expressions are still widely in use, the Basic Emotions Hypothesis has been challenged for its oversimplification of emotions as it cannot reveal complex emotions in real-life situations (Cabanac, 2002).

Recent research on emotions emphasises the psycholinguistic perspective in operating emotions. Instead of the innate, categorical view of emotions by Ekman, the Constructed

Emotion Theory argued that there is not a clear boundary between emotions (Barrett, 2016). They proposed that people can only distinguish different emotions from merely valence and arousal until they cognitively establish the concept of emotion. In building these concepts, emotional vocabulary acts as the scaffold where people gradually input various emotional instances. Eventually, people could be able to access and manage emotions via their constructed emotion concepts (Lindquist and Barrett, 2008), and emotion lexicon is the key in the operation. This theory has been supported by experimental research. Neuroimaging studies showed that there are not specific brain regions for different emotions (Lindquist et al., 2012). Rather, multiple brain areas are activated when experiencing emotions or processing emotional materials. This indicates the physiological bases for emotions are not distinctive but interactive. Moreover, many longitudinal studies show that early language exposure is important for people to establish understanding of emotions. In infants, the present of verbal cues could facilitate them to learn abstract concepts (Welder & Graham, 2006). The exposure to feeling-state conversations before school age is also found positively associated with children's ability to interpret emotions later in life (Dunn et al., 1991). These evident the essential role of language in encoding emotion concepts and decoding emotions. Emotions are not fixed physiological expressions – rather, they are fluid to cultures, societies, and even individuals. Therefore, evaluation and interpretation of emotions require the consideration of people's emotional experience and language background.

Pavlenko (2008) further distinguishes between emotions, emotion concepts, and emotion lexicons. She views emotion concepts as prototypical scripts and describes them as "a result of repeated experiences and involve causal antecedents, appraisal, physiological reactions, consequences, and means of regulation and display". In other words, emotion concepts are embedded within cognition and are associated with psychological and social processes (Pavlenko, 2008). Consequently, emotion lexicon involves not only those emotion labels, but all emotionally charged vocabulary. She categorized emotion lexicon into three types: emotion words, emotion-related words, and emotion-laden words:

Emotion words are seen as words that directly refer to certain emotional states ('happy', 'angry')

or processes (‘to worry’, ‘to rage’), and function to either describe (‘she is sad’) or express them (‘I feel sad’)”.

Emotion-related words describe behaviours related to particular emotions without naming the actual emotions, such as ‘tears’, ‘tantrums’, and ‘to scream’.

Emotion-laden words are words that do not refer to emotions directly but instead express (“jerk”, “loser”) or elicit emotions from the interlocutors (“cancer”, “malignancy”). There are six subcategories:

(a) taboo and swearwords or expletives (“piss”, “shit”)

(b) insults (“idiot”, “creep”)

(c) (childhood) reprimands (“behave”, ‘stop”)

(d) endearments (“darling”, “honey”)

(e) aversive words (“spider”, “death”)

(f) interjections (“yuk”, “ouch”)

(Pavlenko, 2008, p.148).

For emotion-laden words, Pavlenko (2008) also argued that the boundaries of these subcategories are not clear. First, some words may cross categories, such as the taboo word “shit”, which could also function as an insult. Second, emotional connotations in discourse play an important role in defining emotional-laden words, as many of them are not normally considered emotional-ladened. For instance, “elite” might be seen as an insult in some contexts (Pavlenko, 2008).

In addition, Pavlenko (2008) claimed that emotion lexicons are less concrete but more memorable than other lexicons. She cited the survey conducted by Altarriba et al. (1999) in monolingual English speakers. This study showed that emotion words were rated significantly different from other concrete and abstract words. People considered that it is more difficult for them to recall a situation through an emotion word (context availability) compared to both concrete words and other abstract words. However, while abstract words are less imageable than concrete words, participants reported higher imageability of emotion words than other abstract words. A later study in Spanish-English bilinguals replicated the results (Altarriba,

2003). Although the ratings of imageability and concreteness are equivalent in both languages, Spanish emotion words could be visualized and contextualized more readily compared to the corresponding English words. This suggests different perceptions of emotion words in L1 and L2. Pavlenko also cited several surveys regarding memorability in native English speakers and found that participants could better recall emotion words and emotion-laden words than neutral words. In bilingual speakers, however, the emotion-memory effects in the two languages are different and vary depending on the valence. These findings further indicate the interaction between language and emotion and suggest that the interpretation of emotions may vary across people. Meanwhile, they suggest a different representation of emotion lexicon in bilingual speakers' two languages.

These emotion theories are not necessarily incompatible. While the operationalization could be either physiological or psycholinguistic, this review is aligned with the Constructed Theory in terms of the construction of emotions. In other words, this review acknowledges the subjective definitions of emotions and considers the differences across definition as an indicator of individual affective ability and social cultural discrepancy.

2.1.2 Functions of language in emotions operation

Previous research indicates that language is related to both the encoding and decoding of emotions (Dewaele, 2010a). The encoding of emotions is the process of developing emotion concepts through inputting different emotional experiences (Hoemann et al., 2019). As mentioned in 2.1.1, early emotional language exposure could facilitate infants and children to build emotion concepts (Dunn et al., 1991), suggesting the importance of language in emotional development.

On the other hand, the decoding of emotions is more complex and involves multiple processes, such as perception, experience, and interpretation of emotions. Research finds that people's linguistic competence is positively correlated to their ability to appraise and regulate emotions (Lindquest et al., 2006; Streubel et al., 2020). Particularly, the size and depth of

emotional lexicon are two important factors in this correlation. In Schwering et al. (2021), it was found that people could better imagine and relate to fiction novels and show higher emotional arousal if they had a more developed emotional lexicon. Moreover, in several affective-priming studies, people who named the emotion before an emotional-invoke scenario would experience more solidified emotions (Lindquist & Barrett, 2008) but also lower emotional arousal (Lieberman et al., 2007; Kircanski et al., 2012). Similarly, research on emotional granularity finds that people who could differentiate emotions with more discrete emotional words are less likely to suffer from emotional distress (Demiralp et al., 2012). Studies in adults with alexithymia further evidence the importance of language in decoding emotions. Alexithymia is a personality trait, with which people would have trouble in processing and experiencing emotions (Coppini et al., 2023). Researchers found that people with alexithymia often coexist deficits in language processing, indicating the overlap between language and emotional processes (Coppini et al., 2023). These findings suggest that accessing emotion lexicon may evoke people's memories of encoding the emotion and activate their embodied sensations (Schwering et al., 2021). This process allows people to decode the emotion and have more control over the emotions, while difficulty in accessing emotion lexicon may cause problems in decoding emotions.

Aside from encoding and decoding, another important function of language is to express emotions. While it seems obvious that most people use language to communicate emotions, typically combined with body language and facial expression, people's language behaviour may be changed after they acquire an additional language. This will be expanded in section 2.3.

This section briefly introduced several influential emotion theories and demonstrated the link between language and emotions, and the functions of language in operating emotions. The following sections will explore the unique emotion process in bilingual and multilingual people and their language choice in communicating emotions.

2.2 Multilingualism and emotions

Multilingualism here refers to people who are able to use more than one language. With globalisation and technology development, people's mobility is hugely improved, and overseas communication is more feasible (Grosjean, 2013). As the number of multilinguals increases, research on multilingualism has therefore received more attention. Grosjean (1985) states that bilingual people are not simply the sum of two monolinguals; instead, they develop their own unique language behaviour. According to Hamers and Blanc (1989), language is a tool with social and psychological functions, and multilingual people's language behaviour is shaped by societal and individual factors. People's language behaviour is therefore also dynamic as the constantly changes in the society and individual environments (Dewaele, 2010a). Gradually, bilingual people assign different functions to the two languages based on their experiences. From two perspectives, linguistical and psychological, this section will introduce how acquiring an additional language may change the interaction between language and emotions and lead to unique bilingual language behaviour.

2.2.1 Cross-linguistic differences in emotion lexicons and concepts

Different languages have different representations of emotion lexicons and vary in function, encoding, and salience (Pavlenko, 2008). While most languages have a specialized group of emotion words, some languages do not even have a superordinate term for "emotion". The lack of a lexical equivalent term for "emotion" does not indicate that people do not experience emotions in that culture, but it may lead to difficulties in discussing a unified and coherent category of emotions through that language (Pavlenko, 2008). Meanwhile, the grammatical categories in encoding emotion also different across languages. Some languages tend to use verbs to encode emotions and see these verbs as relationship-marker of personal and interpersonal processes. For instance, Russian and Polish. Other languages, like English or Dutch, prefer to use adjectives and nouns to encode emotions and consider them as self-markers of inner states (Pavlenko, 2008).

The concepts of emotions are also different in each language. Pavlenko (2008) listed a few

examples and pointed out four types of concepts differences: causal antecedents of emotions, appraisals, physiological reactions, and consequences and means of emotion regulation and display. Causal antecedents of emotions refer to the judgements regarding the cause of emotions. While some cultures see emotions as responses to external events and mental perceptions of these events, other cultures think emotions are generated by other people or internal organs. For instance, Russian may "revnost" (jealous) if someone flirting with their partners while English may "jealous" for others' good fortune. Appraisals refer to the evaluation of what causes emotions and their consequences. For instance, the behaviour of dependence, "amae", is viewed positively in Japan, but negatively in Western countries. Physiological reactions are the somatic states associated with certain emotions. For example, a Greek emotion word "stenahoria" (sadness, suffocation) may invoke feelings of difficulty to breath, while this is not commonly accompanied with the feeling "sadness". The last type of difference is consequences and means of emotion regulation and display. This could be explained as some cultures emphasize on emotional control while other cultures favour self-assertion (Pavlenko, 2008). From the above examples, it is clear that emotion lexicons and concepts are different across cultures and languages. Therefore, the concept comparability between languages may influence language learners' understanding of emotions in their LXs. Especially when there is no equivalent counterpart in the other language, such as some culturally specific concepts, language learners may experience difficulty in transferring their knowledge and internalizing these words and concepts (Pavlenko, 2008). These cross-linguistic differences may lay the foundation for multilingual speakers of encoding and decoding emotions differently in their LXs.

2.2.2 Language emotionality and embodiment

More than the linguistic level, bilingual people also have different perceptions of their two languages on the psychological level. Emotionality refers to "automatic arousal elicited by particular languages or words" (Pavlenko, 2008). Previous research found that people feel differently in their L1 and LXs, with a stronger emotionality in the former one and lower in the latter one (Pavlenko, 2008). This phenomenon is especially common in unbalanced language learners who learned their additional language later in life and have limited proficiency

(Gianola et al., 2021). People reported in questionnaires and interviews that they feel more related to their emotions and sensations in their first language and are less emotional and more insensitive in their second language (Dewaele, 2010b). Meanwhile, physiological studies provide direct evidence in terms of skin conductance response (SCR). This is a measure of automatic activity that affected by people's emotion and attention. When people describe their experience in their first language, they exhibit higher SCR than in their second language (Harris et al., 2003; Harris, 2004; Kircanski et al., 2012), indicating a higher emotional arousal level in L1.

The difference of language emotionality in L1 and LX may be explained by the age and context of acquisition and language dominance (Pavlenko, 2008). As the learning of L2 normally happens in a neutral environment, namely at school, later language learners rarely have the chance to use their L2 to express strong feelings (Pavlenko, 2004). Since the input of emotional instances to L2 is not as much as their L1, later bilinguals often form non-equivalent emotional concepts between the two languages. Therefore, they tend to have stronger feelings in their L1 than in their L2. This is supported by Dewaele and Nakano (2012). In their study, over a hundred multilinguals were investigated on their feeling of each of their languages. Participants reported that they felt fake when using their later-learned languages. The later they acquired the language, the less logical, serious, and emotional they felt in that language. Similarly, in a survey with over 300 multilingual people, the majority of participants showed a strong preference for languages acquired earlier in life when they were asked about the language link to their deepest feelings (Dewaele, 2013). Further, Dewaele (2011) found that even in balanced multilinguals who are proficient in both L1 and LXs, they still existed a general preference for L1 in expressing emotions. These findings reaffirm the importance of early language environments in learning emotions and suggest higher emotionality in people's L1.

Meanwhile, researchers argue that the association between L1 and emotions may be changed when LXs become the dominant languages (Pavlenko, 2008). Although most multilingual people retain their L1 as their dominant language, a minority of people develop their additional

languages to be their dominant language due to work and social needs. Within the process, more emotional events happen in their LXs and their frequency of using LX emotion lexicon increases, which supports them in solidifying their emotion concepts. Gradually, the emotionality in LXs may become higher than in their mother tongue through the transfer of language dominance (Dewaele, 2010b).

Pavlenko (2012) therefore proposed the theory of language embodiment, saying that L1 and LX could elicit different levels of emotional arousal depending on the language acquisition process, and bilingual people may feel less embodied of the emotion in one of their languages accordingly. This affective conditioning is especially powerful in early childhood. This echo to the Constructed Emotion Theory that people concurrently associate their memories, sensations, and emotions with the language in the context. Therefore, bilingual and multilingual speakers develop their unique emotion concepts while learning their additional languages and assign different levels of emotionality to emotion lexicon depending on experience. The unique language acquisition experience will also contribute to bilingual and multilingual speakers' unique language behaviours, for instance, the theme of this review, code-switching.

This section showed how bilingual people may develop their unique language behaviour due to linguistic and psychological factors. Various cross-linguistic differences in emotion lexicons and concepts laid a foundation for the different interpretations of emotions. Then, with different ages and contexts of LX acquisition and changes in language dominance, people also allocated different levels of emotionality to their emotion lexicons in L1 and LXs. Emotions were disembodied when people using their later learned, non-dominant languages.

2.3 Code-switch and emotions

Higher emotionality in one language, however, cannot be simply translated as the preference for using that language in expressing emotions (Dewaele, 2011). People often change their languages in different situations, and their language preference is influenced by multiple factors. This section will introduce code-switching from its definitions, underlying motivations for

adopting this language behaviour, and several contexts of using it. Then, I will describe how code-switching may interact with emotions.

2.3.1 Definitions of code-switching

Code-switching (CS), the alternation between multiple languages or dialects, is a common linguistic phenomenon in bilingual and multilingual people (Poplack, 1980). Rather than distinct language choice for different situations, CS happens in a single conversation and involves the process of switching back and forth between two languages (Lipski, 2005). The types of CS could be divided according to the structure or level of integration (Poplack, 1980). It is normally recognized in three types: inter-sentential switching, intra-sentential switching, and tag-switching. Inter-sentential CS refers to the switch at the sentential level. For example:

> "*Hijo de la gran puta* (son of a bitch), I said, sitting down"
> (Sánchez and García, 2020)

Intra-sentential switching refers to the shorter switches within a sentence, which do not violate the grammar of either language. This type of switching is also called code-mixing by some scholars. For example:

> "My brother was usually an animal but in my father's house he had turned into some kind of *muchacho bueno* (good guy)."
> (Sánchez and García, 2020)

These two types of switches are considered more common in people with high language proficiency (Poplack, 1980). The third type, tag-switching, is the shortest switch. It refers to single word, namely, a tag, switches that could happen freely in the sentence. For example:

> "大家 *happy* 一下！(everyone-happy-once; Let's have some fun)"
> (Su, 2018)

One thing worth noticing is the difference between code-switching and lexical borrowing. According to Poplack (2017), if a lexical unit is both morphosyntactically and phonologically integrated into the recipient language, then it is a case of lexical borrowing. On the other hand, if the lexical unit does not show any integration, or only shows syntactical or phonological integration into the recipient language, it is considered as an instance of code-switching. For example, the Italian word "espresso" is considered as a borrowed lexical unit in many languages (Poplack, 2017).

CS could also be categorized by the motivation of switching. Gumperz (1982) claimed there to be two types of CS: situational switching and metaphorical switching. Situational CS refers to the switches that happen when changing the topic, setting, or participant. It infers a close relationship between the language and a certain situation and suggests a predictable linguistic behaviour pattern. Metaphorical code-switching, on the other hand, does not relate to changes in situation. This type of switching is more like a metaphorical signal of changes in the speakers' social identity or psychological distance.

The notion of situational and metaphorical code-switching has been interpreted differently by other scholars. Ritchie and Bhatia (2012) extended it into four categories: social and interpersonal dynamics, situational factors, message-intrinsic factors, and language attitudes. The first motivation is from a socio-psychological perspective. People may switch their language according to their perceived social relationship, neutrality, and speech accommodation. The second source of motivation is similar to a merge of situational and metaphorical switching. Aside from topic, audience, and context, Ritchie and Bhatia further include other social variables like class, religion, gender, and age. They also suggested that bilinguals organize their two languages to serve private and public functions. Language code for the private world conveys personal things like emotions, intimacy, and in-group membership. Language code for the public world is used to create distance, express objectivity, and supress the taboos of interactions. Message-intrinsic is a new factor which refers to linguistic or pragmatic consideration of CS. People may CS for discourse functions such as

quotations, reiteration, hedging, and interjections. The other motivation considers speakers' perceived social norms, alongside the expectation and pressure of using CS. It may indicate how speakers wish to present themselves to others. Ritchie and Bhatia (2012) also mentioned the influence of speakers' language proficiency and dominance on their decisions of code-switching.

2.3.2 Contexts of switching

While the motivations and functions of CS are endless, they cannot be discussed independently of the contexts. A particular interlocutor, topic, or environment could trigger CS and change its frequency (Dewaele, 2010a; Rodriguez-Fornells et al., 2012). Many researchers observed that CS is more likely to happen in familiar environments, or with people in a close relationship (Dewaele, 2010a). Dewaele comments that 'CS is a sign of relative linguistic and cultural intimacy'. People also show a tendency to switch to their first language when discussing personal issues or expressing their feelings, and switch to L2 or LX to communicate objective things (Ritchie and Bhatia, 2012).

Although code-switching is a prevalent behaviour among multilinguals, there are some common situations where CS often occurs. First, CS is often investigated in English as Foreign Language (EFL) classrooms. It is used as a pedagogical strategy of teachers to aid low-level learners, manage classrooms, and build interpersonal relationships with students (Dewaele, 2015). CS is also commonly noticed in psychological counselling sessions. Clients tend to use CS as a way to convey identity, expression, defence, and protection (Costa and Dewaele, 2012). Clients also feel that they are able to manage their emotional flow through CS (Dewaele and Costa, 2013). For instance, while people tend to switch to L1 to express anger, they may use L2 to swear if this kind of emotion has been inhibited in their childhood. Similarly, people may prefer to describe traumatic experiences in their L2 to avoid higher emotional arousal. Perez Foster (1998) further suggests that it might be a defensive strategy to resist treatment if clients only engage in therapy in their later-learned language.

Besides oral conversations, CS also happens in written form in social media and literature. Rijhwani et al. (2017) quantitatively analysed CS patterns in 58 million tweets from Twitter and found 3.5% of them were code-switched. Overall, 85.4% of CS tweets have English as one of the languages. Most CS tweets are English-Spanish (21.5%) and English-French (20.8%). This may be due to the early development and prevalence of social media in Western countries (Rijhwani et al., 2017). In literature, many bilingual and multilingual writers tend to reserve their first language when writing poetry, as it is considered the most emotional literary genre (Pavlenko, 2008). On the other hand, some writers favour writing in their LXs as they are relatively neutral compared to their mother tongue, which may invoke adverse childhood experiences or political oppression (Pavlenko 2005, 2008). Writers' language preferences may also be represented by the characters in their fictional works.

2.3.3 Interaction of emotions and CS

The relationship between CS and emotions is probably bidirectional. As mentioned above, CS is motivated by different purposes and has various functions according to the context. The switch of languages when expressing emotions indicates that CS serves some affective functions. The embodiment of language experience may motivate CS to regulate emotions. As speakers assign different emotionality to their languages (Pavlenko, 2012), they may intentionally or unconsciously switch their languages to move toward or away from emotionally charged material. For instance, people were found tend to switch to L1 for happiness and pleasure, and to L2 to talk about embarrassing topics (Bond & Lai, 1986). On the other hand, emotions is also found affect the onset of CS. Multilingual people are more likely switching languages when feeling sad, frightened, or threatened (Harris, 2004; Santiago et al., 2009).

Overall, language and emotions are closely associated with each other. Language acted as an essential placeholder in developing emotional concepts and serves multiple affective function. By acquiring an additional language, bilingual or multilingual people may develop their unique language behaviours, such as code-switching, and have different emotionality allocated to their two languages. The switching of code was found for multiple affective

functions, such as expressing emotions and regulate emotions. Emotions also affected the onset of CS.

2.4 Gaps in the literature

As discussed above, the Constructed Theory of Emotion indicates the importance of language in operating emotions. When more and more people acquiring their additional languages, the interaction between language and emotions also changed. Bilingual and multilingual people developed their unique linguistic behaviours, code-switching, and applied it for various affective functions. However, there are a few areas have been rarely discussed. First, most of the research only focus on the difference between monolingual and certain bilingual groups. The cross-linguistic and cross-cultural influence on the interaction of CS and emotions has not received enough attention. Only Pavlenko (2008) listed a range of cross-linguistic differences on emotion concepts and emotion lexicons. For instance, if there may have any difference between people with same L1 and different L2s, or people with different L1s and same L2? Second, while both speaking and written CS were found have affective functions, no research has investigated the cross-modality effect on the interaction between CS and emotions.

In addition, although there is much literature on this topic, no systematic review has been done to my knowledge. Therefore, the review will present an overview on the cross-cultural, cross-linguistic, and cross-modal differences on the interaction of CS and emotions.

2.5 Research questions

In order to address the research gaps mentioned above, the current systematic review will investigate the following questions:

(1) If the occurrence of code-switching is associated with affective events?

   a) What functions do CS serve in the affective events?

   b) What kind of emotion is underlying CS?

(2) Is there any cross-linguistic/cultural difference on the interaction between CS and

emotions?

(3) Is there any cross-modality difference on the interaction between CS and emotions?

Chapter 3. Methodology

This review adopted a systematic review design and tried to answer the research questions through in-depth search of the relevant literature. This approach involves a detailed plan and search strategy to assess relevant studies on a particular topic and combines narrative synthesis to provide a complete picture on research questions (Uman, 2011). A protocol is normally designed prior to the search in order to reduce bias of the authors. Completed procedures and sufficient details are provided to allow for replication and further analysis on prospective studies (Petticrew & Roberts, 2006).

A search in ProQuest, PsychINFO, and grey literatures was performed to examine any prior systematic review on this topic and results suggested no published or in progress works on this topic. For transparency, a protocol for this review was registered with the International Database of Education Systematic Reviews (IDESR) in July. However, due to time management issue, the registration was not completed before the submission and may post risk of bias. The protocol was developed through pilot search on this topic and search items were extracted from exemplar studies (Ladegaard, 2018). The submitted protocol can be found in Appendix A.

This report follows the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021).

3.1 Eligibility criteria

A series of inclusion and exclusion criteria were developed and presented in Table 1. Items for inclusion and exclusion were the bibliographic information, date of publication, participants, focus of study, measures of outcomes, and language of publication. Meanwhile, publication status and study design were not included as eligibility criteria since this review seeks to include a wider range of research and is interested in all types of approaches in exploring multilinguals' code-switching patterns and their associations with emotions.

Table 1.Eligibility criteria

Bibliographic Information	Include 1: Studies with a full reference or sufficient information.	Rationale: Without sufficient bibliographic information, retrieval of works is unfeasible.
	Exclude 1: Studies with insufficient bibliographic information.	
Date of Publication	Include 2: Published between January 2014 to July 2023.	Rationale: Since the growth of multilingual is booming in recent years, this review will collect studies conducted within 10 years.
	Exclude 2: Records published before January 2014.	
Participants	Include 3: Studies that involve individuals of any age who are able to understand, speak or write more than one language.	Rationale: This review seeks to assess individuals' code-switching between languages and its interaction with emotions. People who cannot produce more than one language are unable to code-switch.
	Exclude 3: Studies that focus on individuals who can only use one language.	
Focus of the study	Include 4: Reports of studies that aim to examine the role of emotions in producing code-switching behaviours, including both directions – affective functions of code-switching, such as to express, distance, or induce certain emotions; and effects of emotion on language choice.	Rationale: This review focuses on people who produce code-switching behaviours and their emotions when producing CS. Research cannot reveal the interaction and research did not involve the production of CS will not be included.
	Exclude 4: Reports of studies which exclusively focus on emotions with no attention to code-switching behaviours; or studies exclusively focus on code-switching behaviours with no attention to emotions. Reports of studies which focus on people's attitudes toward code-switching. Reports of studies did not focus on the production of CS.	
Outcomes	Include 5: Studies that report measurements of any association between code-switching and emotions as one of their main outcomes. Include studies that report either quantitative or qualitative measures of outcomes.	Rationale: This review focuses on the relationship between language choice and emotions. A wider focus on links between CS and factors other than emotions, or links between emotions and factors other than language choice is not the focus of this review.

	Exclude 5: Studies that do not report any link between language switching.	
Language of publication	Include 6: Studies published in English.	Rationale: Accurate translation is essential in this study since it involves analyses of more than linguistic behaviour but also cross-linguistic/cultrual differences. Since the review aim to include participants from any language background, it is difficult to recruit enough proficient translators of different languages. Therefore, the review will only focus on studies published in English to ensure the accuracy of understanding.
	Exclude 6: Studies not published in English.	

The literature search yielded 1944 articles. After 896 duplicates were removed, screening on title and abstract excluded 928 of the 1048 unique papers. The remaining 120 articles were retrieved and screened on reading the full text (see the flowchart in 4.1.1 Figure 1). In the title and abstract screening, the major reason for excluding paper was because they did not investigate CS (N=315). Many of them were natural language processing analysis on code-mixed texts. Many studies adopted a different definition of CS, such as switching between behavioural codes and verbal codes, switching between formal and informal languages, or switching between in-group and out-group languages. The next major reason was because they did not specifically mention emotions in their measurements (N = 218). No paper was excluded due to publish language at this stage since all studies provided English abstracts. After retrieval, 99 studies were remained for full-text screening. Two papers were excluded due to written in French. One paper was excluded since it assessed the perception of CS on emotions processing, not the production of CS (Tomic et al., 2020). The most common reason for excluding at this stage was not examine the interaction of CS and emotions (N = 42). One paper was identified in forward or backward citation chaining. Eventually, 19 papers were included in the analysis.

3.2 Information source and search strategy

Four databases, ProQuest, PsychINFO, Web of Science, and Scopus across linguistics, psychology, and multidisciplinary fields were used. Searches were also conducted on Google

Scholar to encompass any literature was not present in the other databases. The initial search was followed by both forward and backward citation searches, whereby the reference lists of all studies that meet the inclusion criteria were screened for additional potentially eligible studies.

Search terms should be able to cast a wide enough net to capture all target studies and meanwhile ensuring a narrow enough focus to avoid a large proportion of irrelevant research (Brunton et al., 2017). Several pilot searches were conducted to identify the more necessary key words used in relevant literature. Two search fields were applied as the research questions of this review focused on the interaction between CS and emotions. These search term and linkage are presented in Table 2. Details of the search term in each database are listed in Appendix B.

Table 2. Search term and linkage

Field	CS		Emotion
Search terms	code-switch* OR code-mix* OR code-alter* OR “code alter*” OR "code switch*" OR "code mix*" OR “language choice*” OR “spoken exchange*” OR “language alter*” OR “language switch*” OR “language mix*”	AND	emotion* OR affect* OR mood* OR feel*

3.3 Selection process

The final search started on the 14th of July 2023. Papers found in the databases were uploaded to Rayyan, an online platform designed for systematic review screening and allowed multiple authors to collaborate. After deduplication, abstract and title screening was conducted in Rayyan. Papers fitted the inclusion criteria were selected for retrieval. Papers that were not able to access to the full text were removed. Full-text screening was conducted in Rayyan, papers fitted the inclusion criteria were included in the review for further analysis. Eligible studies were then exported to Microsoft Excel for data extraction. Details of selection process were displayed in Figure 1 The PRISMA (2020) flowchart in next chapter. This flowchart was adopted by Page et al., 2021.

3.4 Data collection and data item

A data extraction form was designed in Microsoft Excel to collect target items. The following items showed in Table 3 were collected from each study and were selected to answer the research questions. From pilot searches, I noticed that most eligible studies were qualitative or descriptive studies and did not involve any intervention. Participants' language experience was assessed by nationality and language backgrounds.

Table 3. Data item

Field	Items
1) Participants' demographic information	a) Age
	b) Gender
	c) Nationality
2) Study design	a) Type (Qualitative vs. Quantitative vs. Mixed)
	b) Country of conduct
	c) Sample Size
	d) Research Context
	e) Data source and collection
	f) Actual language evidence
3) Language background	a) First language
	b) Second language
	c) Proficiency
4) Code-switching patterns	a) Function/purpose
	b) Frequency
	c) Position (intra-sentential, inter-sentential, tag-switching)
	d) Consciousness (intentional or unintentional)
	f) Modality (Speaking, Writing)
5) Emotions	a) Type of emotions
	b) Valence and arousal
	c) Effect on CS

3.5 Risk of bias of individual studies

Methodology of each reviewed studies is varied and involves different types of risk of bias, and a cumulation of individual bias may lead to weak in transparency (Boland et al., 2014). Differences in methodology also result in different levels of internal and external validity, which further influence the reliability and generalizability of findings. Therefore, to systematically

identify and reduce the overall bias and attain meaningful and representative evidence, researchers need to follow certain steps to appraise individual studies and weigh the results accordingly (Boland et al., 2014).

Since the review aims to include all types of studies, the tool to assess each individual study should be able to assess both qualitative, quantitative, and mixed methods research. Therefore, Mixed Methods Appraisal Tool (MMAT) Version 2018 (Hong et al.) was adopted to assess the methodological quality of individual study. This assessment tool is designed for systematic review of all types of methods and has been updated several times by experts (Hong et al., 2019). The MMAT could be used to appraise 5 categories of studies and each category contains 5 criteria. Researchers mark "yes", "no", or "can't tell" to each criterion in the relevant categories and provide a global rating of the study. For mixed methods studies, researchers need to assess them with both qualitative, quantitative, and mixed methods criteria. Studies only contain one type of data are only needed to be assessed once with the relevant criteria. Details of the template and user guides of MMAT can be found in Appendix C. Since all studies included in the review were observational or descriptive studies, only three categories of MMAT criteria, qualitative, quantitative descriptive, and mixed methods, were adopted in assessing and were presented in Table 6 in the result chapter.

3.6 Synthesis method

The process of synthesis brings findings from each reviewed study together to draw an overall conclusion. As outcome measures varied across the studies and are mainly qualitative according to the pilot search, a narrative synthesis was conducted under the criteria of Popay et al. (2006). In the guideline, four elements are essential for narrative synthesis: the theory underlie review questions; a preliminary synthesis of findings of included studies; relationships in the data; the robustness of the synthesis. In narrative synthesis, researchers are also suggested to provide textual description of individual study and group them according to their features, such as data type, participants, and outcomes. Tabulation is also recommended. In the next chapter, this review will present (1) preliminary findings of groups divided by different features,

(2) textual description of individual study, and (3) summary of overall findings.

Chapter 4. Results

This chapter reports the general characteristics and findings of the final selected studies. First, I present an overview of the current study. In 4.2, I give a short narrative summary of each individual study. Then, in 4.3, I evaluate the risk of bias of both individual studies and the cumulative confidence about the body of evidence as a whole. In the last section of the chapter, I report the synthesis results and link back to my research questions. A full list of reviewed studies can be found in the Appendix D.

4.1 Overview and general characteristics

Ultimately, a total of 19 papers were eligible for the review. The PRISMA flowchart (Figure 1, adopted from Page et al., 2021) provides further detail on the screening process. Table 4 presents the general characteristics of each individual study.

Figure 1. The PRISMA (2020) flowchart

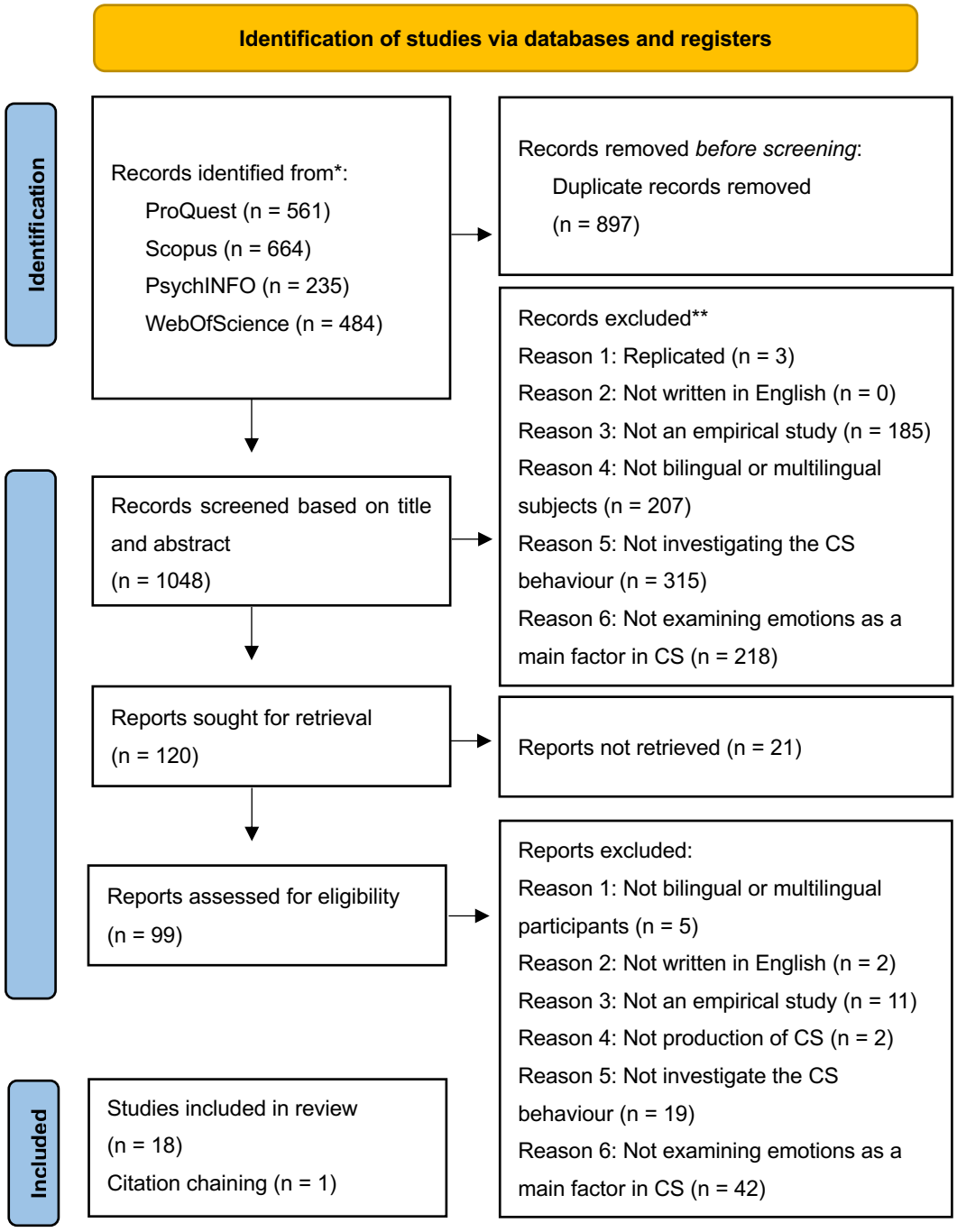


Table 4. Summary of Characteristics

Study	Sample Size	Study Location	Language Background	Country of Origin	Modality	Context (of CS)	Data Type	Method	Actual language data	Analysis	Measure	Outcome (the interaction)
1. Vaschetto and Martos-Perry, 2016	105 (F=49, A=18-73)	Online Survey	Mixed (People who learned Spanish or English before the age of 16)	Mixed (U.S. = 56.4%; Mexico = 27.8%)	Not specified	Not specified	Quantitative	Questionnaire	No	Correlational	Situations of CS; Switch directions	Participants tend to switch to L1 to feel most like themselves, to handle their feelings. They tend to switch to L2 when feeling emotional, to better express emotions. They have similar tendency switch to L1 and L2 when they want to become more aware of emotions and to feel more in control of their emotions. Most of the switches were likely unintentional.
2. Nafa, 2018	5 (F=5; A=27-38)	United Kingdom	Arabic-English (One of them perceived herself as English-Arabic) (Four of them came to the UK from around seven to nine years ago and the other one came during childhood)	Mixed (Libyan = 4; Syrian/Palestinian = 1)	Speaking	Mixed (Peer group interaction, daily conversation with family and friends)	Qualitative	Audio recordings, semi-structured interviews, self-recordings, retrospective participant commentaries, and questionnaires	Yes	Conversation analysis	Stances of Affect	Participants tend to CS in two situations: to express their feeling toward an incident or an object, and to express their feelings about carrying out a certain task or their willingness to do a task. CS to English could be either positive or negative affect stances.
3. Trede, 2017	10 (F=9, A=28-76)	United States	Spanish-English (Mixed levels of proficiency and different age of arrivals in US)	Mixed (Puerto Rico = 8; US = 1; Dominican = 1)	Speaking	Counselling	Qualitative	Semi-structured interview	No	Discourse analysis	Clients' perspective on bilingual therapy	Most participants switched to Spanish to better express themselves, to express intense emotions, to connect to their emotions and thoughts. They also switched to L2 to manage emotions.
4. Su, 2018	30	Online/ China	Chinese-English characters in Chinese web novels, by Chinese author	China	Writing	Literature	Quantitative	Corpus collection	Yes	Corpus analysis	Function of CS	Three affective functions of switching to L2, English, were identified. One was act as a euphemism to discuss taboo words and avoid offense. Another one was to convey affection while avoiding embarrassment. The third one was to mark emphasis and express strong emotions like anger and surprise.

5. Sánchez and García, 2020a	1	--	Spanish-English characters by Latino author in the US	Latin	Writing	Literature	Quantitative	Corpus collection	Yes	Corpus analysis	Type of CS; Differences in language emotionality	Three types of CS, intra-sentential, inter-sentential, and tag-switching to L1 were found. More than half of these CS were emotionally charged words and were used to signal disapproval, embarrassment, astonishment and surprise, and criticism.
6. Alhourani, 2018	4 (A=19-25)	Saudi	Arabic-English	Saudi	Speaking	Not specified	Qualitative	Observation, audiotaping, and semi-structured interview	Yes	Conversation analysis	Function of CS	Participants CS to express feelings, like "love".
7. Hadour, 2022	744	France	French-English tweets by Twitter users geolocated in France	France	Writing	Social media	Quantitative	Corpus collection	Yes	Corpus analysis	Discourse functions of CS and pragmatic motivations for CS	More than half of the collected CS tweets were associated with emotions. Users mostly switched to English for words like "wtf", "omg", and "love". CS was used to fit the character limit on Twitter or to reduce emotional force.
8. Carstens and Hoon, 2019	38 (F=18, A=21-50)	Malaysia	Mixed (Chinese/ English/ Hokkien)	Malaysia	Speaking	Mixed (Coffee shop, restaurant, company, school)	Mixed	Observation, audiotaping, interview, and questionnaire	Yes	Conversation analysis and Corpus analysis	Semantic domains of CS language lexemes	When CS, the three languages served different functions. Chinese topolects were mainly used for expressing emotion while the other two languages were used for other topics.
9. Tale and Alqahtani, 2020	52 (F=52, A=18-20)	Saudi	English as L2 (Official language: Arabic)	Saudi	Speaking	Classroom	Quantitative	Questionnaire	No	Paired-samples t-test	Affective Sustenance	CS was considered to provide students with more affective sustenance compared to the target-language only classroom.
10. Chi, 2016	42 (A=20-60)	United Kingdom, China	Mixed (Chinese-English/other languages)	Mixed (Taiwanese and other nationalities)	Speaking	Not specified	Qualitative	Audiotaping	Yes	Conversation analysis	Affective stance	CS was used to take stances in disagreement conversations between couples. It was used to highlight emotions, show alignment, signal compromise, defend, express surprise, increase affective intensity, and express affective proposition.
11. Rudra et al., 2016	3,357	Online/ India	Hindi-English	Not specified	Writing	Social media	Quantitative	Corpus collection	Yes	Corpus analysis and Correlational	Language preference for expressing sentiment	A switch from English to Hindi was correlated with a switch from positive to negative sentiments, especially swearing.
12. Yarzebinski et al., 2015	78 SE =1810	Philippine	Filipino-English	Not specified	Writing	Classroom	Mixed	Corpus collection	Yes	Paired-samples t-tests and Discourse analysis	Content expressing via CS	Students applied CS in self-explanation to express negative emotions.

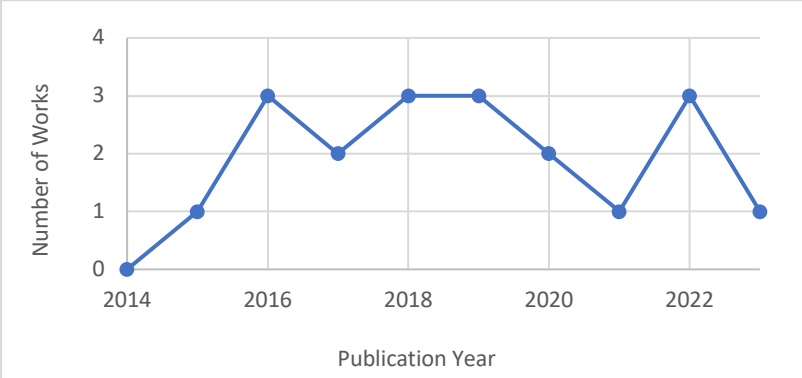
13. Rolland et al., 2017	109 (F=92, A=18-80)	Online Survey	Mixed (English as L1 = 47, as L2/LXs=48, 14)	Mixed (42 countries)	Speaking	Counselling	Mixed	Questionnaire	No	Descriptive analysis	Reasons for CS	Nearly half of the clients used CS to fully express emotions. No one reported that they used CS to control their emotions nor avoid cultural taboo. Some participants, however, reported that they used CS to distance emotions.
14. Sánchez and García, 2020b	3	--	Spanish-English characters by Latino author in the US	Latin	Writing	Literature	Mixed	Corpus collection	Yes	Corpus analysis	Relationship between CS and emotional events	The character spontaneously switched to L1, Spanish, when getting emotional or in highly emotional situations. CS itself also acted as an emotional expression. All types of CS were related to express emotions, with a positive bias for valence and a negative tendency for arousal.
15. Nawaz et al., 2023	100	Pakistan	English as L2 (L1=Punjabi, Pashto, Balti, Sindhi, Saraiki)	Not specified	Not specified	Classroom	Quantitative	Questionnaire	No	Correlational	Students' thoughts of using CS in EFL classroom	More than 80% of students agreed that CS was helpful in expressing emotions. CS provided affective support by boosting students' confidence, fostering their motivations, and making them comfortable in the classroom. Students' affective states were positively correlated to teachers' application of CS.
16. Hammoud, 2020	1	--	Arabic/Bengali-English characters by Bengali-English Author	Bengali	Writing	Literature	Qualitative	Corpus collection	Yes	Discourse analysis	Reasons for CS	Characters tended to switch to their L1 under stress and saw their L1 as an outlet of pain. They linked the language to positive feelings. Meanwhile, they also switched to L1 to express anger. CS was seen as a way to create barriers and psychological distance in this case.
17. Erol, 2022	217 (F=120, A=14-17), 4	Turkey	Turkish-English	Not specified	Not specified	Classroom	Mixed	Questionnaire, interview	No	Correlational; Conversation analysis	Reasons for CS	Nearly half of the students reported that they code-switched to express personal emotions and to decrease their anxiety while speaking. Teachers and students in their interview also mentioned the function of CS for expressing emotions and decreasing anxiety.

18. Ng and Lee, 2019	5 (F=3, A=25)	Online/ Malaysia	Chinese/Malay-English	Mixed (Chinese=3, Malay=2)	Writing	Workplace and Social media	Qualitative	Systematic observation and linguistic analysis	Yes	Discourse analysis	Reasons for CS	Participants were restricted of CS in workplace. In informal settings, participants switched codes when feeling emotional or used CS to express emotions. They also switched codes to create emotional effects on their audience to connect emotions.
19. Ladegaard, 2018	107	Indonesia, Philippine, China	Bahasa/Javanese-English	Indonesia, Philippines	Speaking	Counselling	Qualitative	Interview	Yes	Conversation analysis	The use of CS in storytelling	CS was used by domestic migrant workers when describing their traumatic experiences or when feeling emotional.
F = Female, A = Age												

4.1.1 Publication details

Table 4 provides details of the publication year of each individual study. Figure 2 displays the trend of publication. This review focuses on studies in the last 10 years since 2014; the oldest paper reviewed was published in 2015 (Yarzebinski et al.) and the newest one was published in 2023 (Nawaz et al.).

Figure 2. Number of works by publication year



Among the 19 selected papers, 12 of them are journal articles, 2 are conference papers (Rudra et al., 2016; Su, 2018), and the rest are thesis papers (Carstens and Hoon, 2019; Erol, 2022; Nafa, 2018; Vaschetto and Martos-Perry, 2016; Trede, 2017).

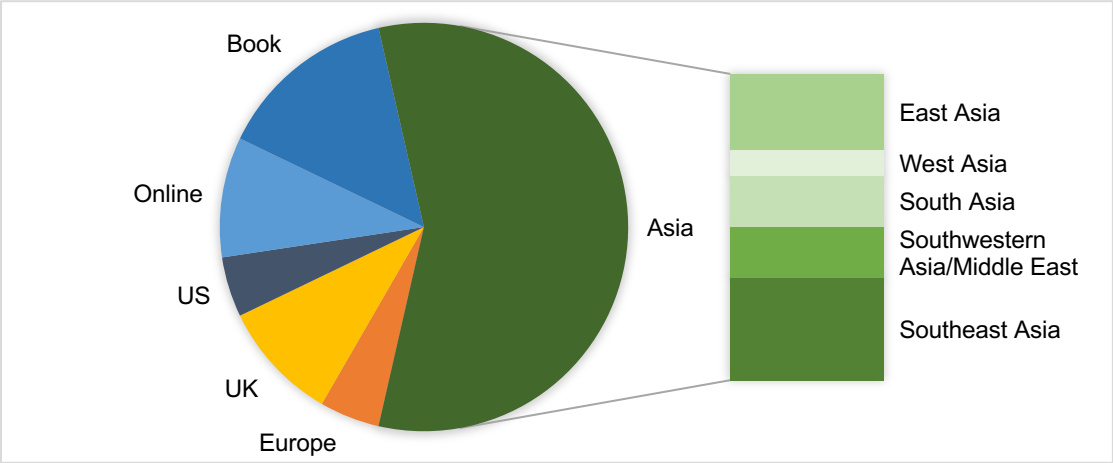
4.1.2 Instructional context

Aside from the 3 analyses of books (Hammoud, 2020; Sánchez and García, 2020a; Sánchez and García, 2020b) and 2 online surveys of worldwide populations (Rolland et al., 2017; Vaschetto and Martos-Perry, 2016), the rest of the studies were conducted in the United Kingdom (Chi, 2016; Nafa, 2018), China (Chi, 2016; Su, 2018), Malaysia (Carstens and Hoon, 2019; Ng and Lee, 2019), Philippines (Yarzebinski et al., 2015; Ladegaard, 2018), Saudi (Alhourani, 2018; Tale and Alqahtani, 2020), United States (Trede, 2017), India (Rudra et al., 2016), Pakistan (Nawaz et al., 2023), Turkey (Erol, 2022), Indonesia (Ladegaard, 2018), and France (Hadour, 2022) (not mutually exclusive). Figure 3 demonstrates the general regions of these studies. More than half were conducted in Asia (N=12), among which 4 were based in Southeast Asia. Chi (2016) and Ladegaard (2018) involved more than one geographic region.

While all studies were instructed in English, only 3 of them were carried out in English speaking countries (Chi, 2016; Nafa, 2018; Trede, 2017).

With respect to the 3 studies of book, two of them had a background in the United States (Sánchez and García, 2020a; Sánchez and García, 2020b), the other one's background was in the United Kingdom.

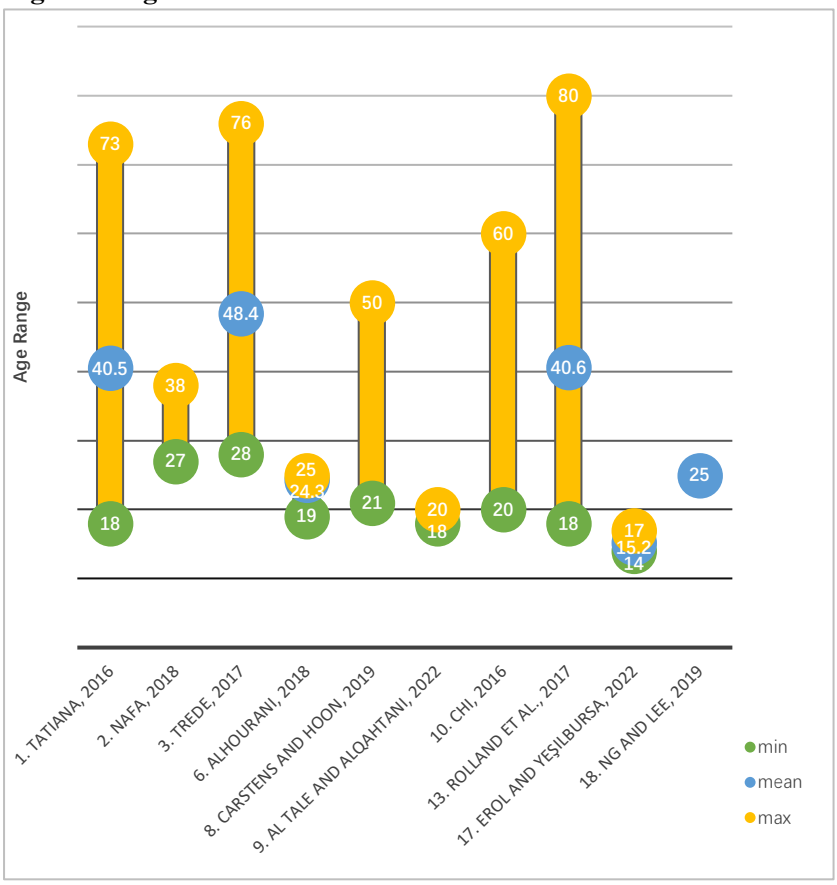
Figure 3. General regions of studies



4.1.3 Demographics

In the 13 studies involving human participants, 9 studies provided the age distribution of their participants and 6 provided the mean age, as displayed in Figure 4. Yarzebinski et al. recruited participants from a primary school. Nawaz et al. (2023) focused on university students. Four participants described in Ladegaard (2018) were from 34 to 44 years old. Most of studies have a relative focused age group while 5 studies have a wider age distribution. The other 6 studies focused on contents from literature or social media and did not provide any information about age.

Figure 4. Age distribution



Details of participants' language backgrounds were displayed in Table 4. All studies involved participants using English as their L2 or LX. Spanish and Chinese are the two most common L1 in the reviewed studies (N=4 separately), followed by Arabic (N=3), and English (N=2). One study did not specify the L1 of their participants (Tale and Alqahtani, 2020). In terms of nationality, most of studies had a mixed or non-specified sample composition. In general, the majority of studies mainly focused on people from Asian countries (2, 3, 4, 6, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19), 5 studies focused on Western countries, including US, UK, and Europe (1, 5, 7, 10, 13, 14).

As mentioned in 2.2.1, the cross-linguistic difference on emotion concepts were associated with cultural differences (Pavlenko, 2008). Therefore, this review will categorize language background based on general cultural differences, namely, western versus eastern. Overall, only 6 studies involved participants originally from western countries and had L2 of western languages (Spanish, French, English) (study 1, 3, 5, 7, 13, 14). The remaining studies all

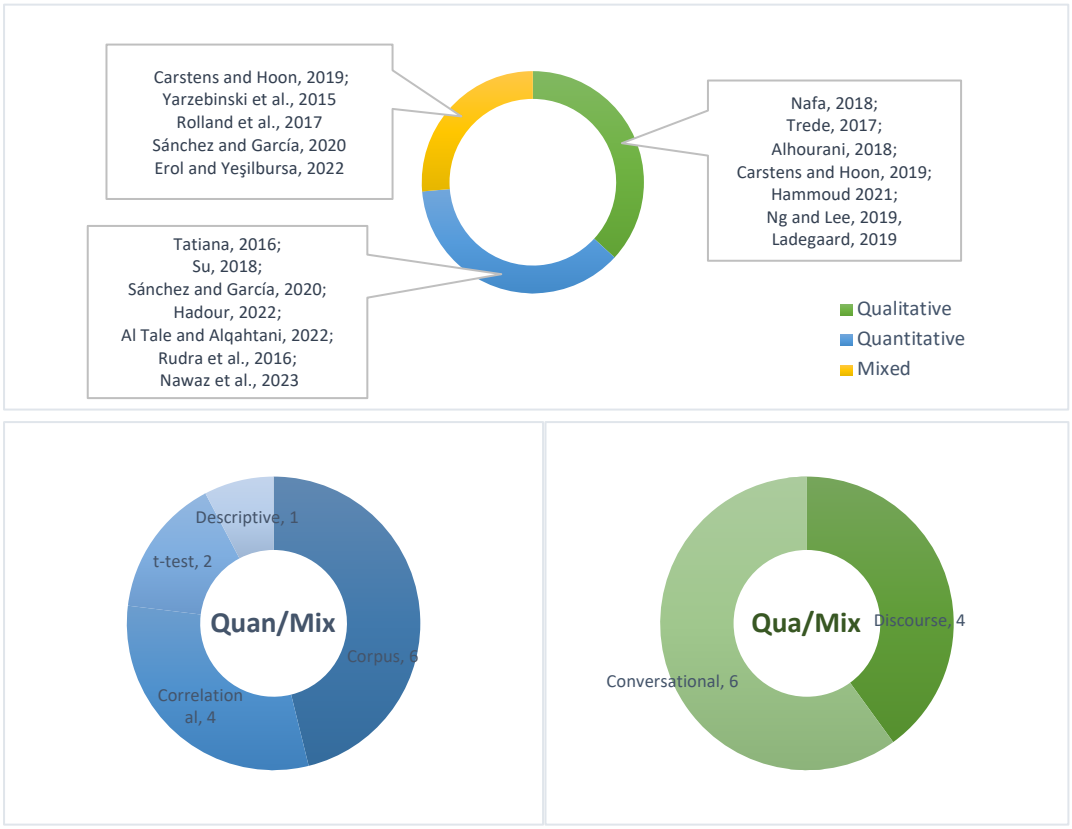
included participants with an Asian L1 and English as L2.

4.1.4 Study design

Some of the reviewed studies employed several methods on different research questions. This review only included the part that related to the interaction of CS and emotions. Details are all listed in Table 4.

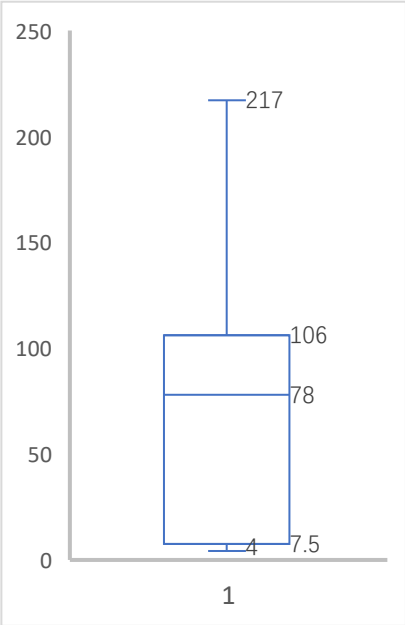
All studies are descriptive studies and did not involve any intervention. In terms of the data type, 7 studies are quantitative, 7 are qualitative, and 5 are mixed methods. Details are displayed in Figure 5. Within quantitative and mixed methods studies, 6 of them adopted corpus analysis, 4 used correlational analysis, 2 used paired-samples t-tests (Tale and Alqahtani, 2020; Yarzebinski et al., 2015), and 1 only used descriptive analysis (Rolland et al., 2017). Within qualitative and mixed methods studies, 6 of them adopted conversation analyses and 4 used discourse analyses.

Figure 5. Data types



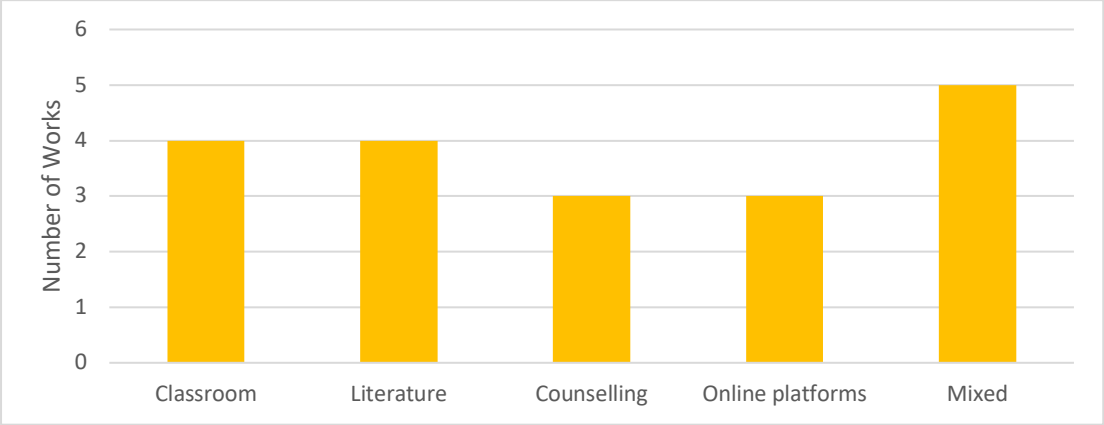
The sample size of studies involving human participants is displayed in Figure 6. These values range from 4 to 217, with a mean of 71 and a median of 78. Of these 13 studies, 5 studies (Alhourani, 2018; Carstens and Hoon, 2019; Nafa, 2018; Ng and Lee, 2019; Trede, 2017) reporting qualitative findings elicited data from fewer participants than the overall median of reviewed studies.

Figure 6. Sample size of studies involving human participants



Of the 19 studies, 4 focused on CS in classroom (Tale and Alqahtani, 2020; Erol, 2022; Nawaz et al., 2023; Yarzebinski et al., 2015), 4 investigated the use of CS in literature (Hammoud, 2020; Sánchez and García, 2020a; Sánchez and García, 2020b; Su, 2018), 3 assessed CS within highly emotional environment (therapy or traumatic storytelling) (Ladegaard, 2018; Rolland et al., 2017; Trede, 2017), 3 assessed CS in social media or the workplace (Hadour, 2022; Ng and Lee, 2019; Rudra et al., 2016), and the remaining 5 involved a mixture of settings, as showed in Figure 7.

Figure 7. Context of study



Equal numbers of studies focused on the two formats of CS, speaking and writing, with 3 studies not specifying the modality (Erol, 2022; Nawaz et al., 2023; Vaschetto and Martos-Perry, 2016).

Figure 8. Research Modality

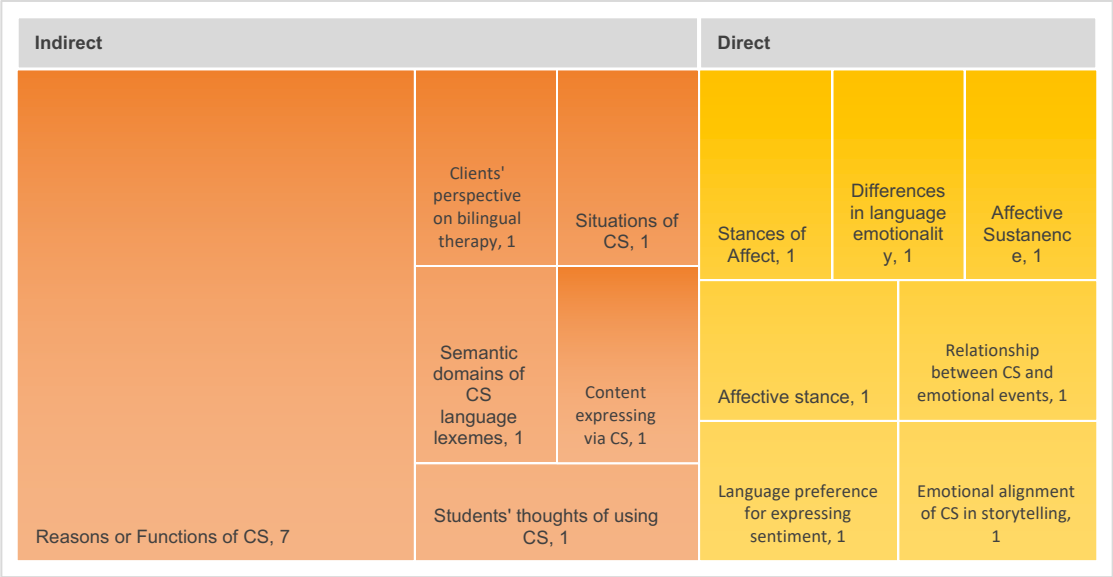
4.1.5 Reported outcomes

Among all reviewed studies, 13 of them did analysis on actual language data; the remaining 6 adopted surveys or interview and focused on participants' self-reported recollection experience (Tale and Alqahtani, 2020; Erol, 2022; Nawaz et al., 2023; Rolland et al., 2017; Vaschetto and Martos-Perry, 2016; Trede, 2017).

Within the 13 analyses on actual language data, 6 studies assessed the interaction between CS and emotions directly; the remaining 7 studies identified affective functions when exploring

general functions or reasons of CS. Within the 6 retrospective studies, only 1 of them assessed the interaction directly (Tale and Alqahtani, 2020) while the remaining 5 indicated the interaction when exploring situations of CS, reasons of CS, and clients' perspective on bilingual therapy. Details of specific measures and frequency of outcomes are displayed in Figure 9.

Figure 9. Specific measure and frequency of outcomes



Although some studies assessed inter-sentential, intra-sentential, and tag-switching, they did not measure their relationship with emotions nor provide enough data allowed for secondary analysis.

Four studies suggested unintentional CS (Hammoud, 2020; Ladegaard, 2018; Vaschetto and Martos-Perry, 2016; Trede, 2017).

In terms of switch direction, 12 of 19 studies clearly mentioned the association between switch direction and emotions. Within the 11 studies, 7 investigated switching to L1, 7 investigated switching to L2 (not mutually exclusive). The rest 7 studies investigated CS as a wholistic behaviour. The interaction of CS and emotions assessed by each study was summarised in Table 5. Intrapersonal functions were highlighted in grey and interpersonal functions were in pink. The most common interaction was when people feeling emotional, they would perform CS. Three functions were identified only for CS as a wholistic behaviour.

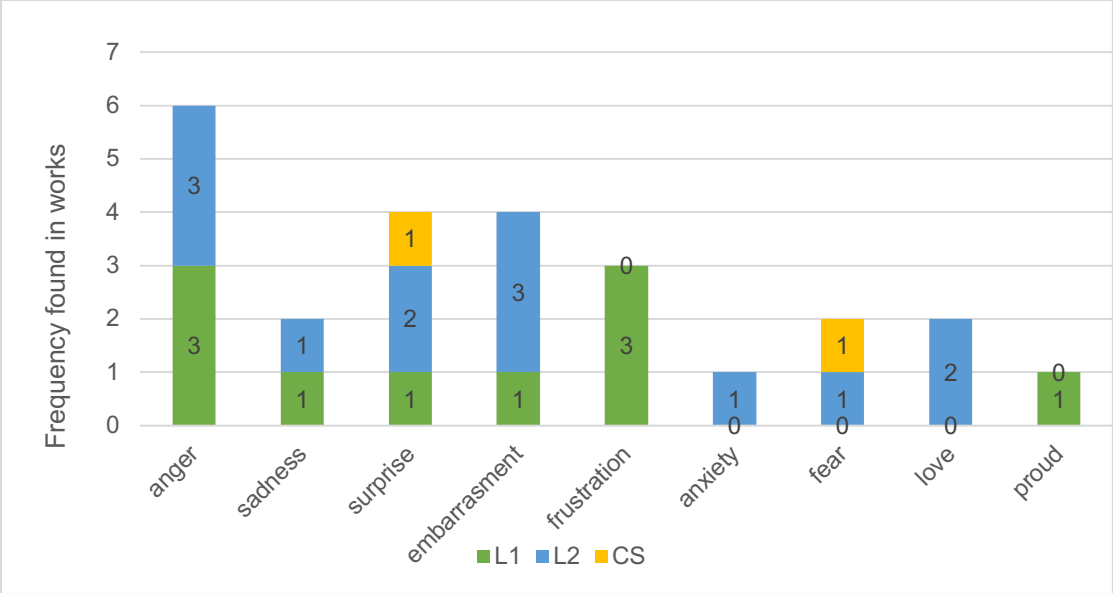
Table 5. Summary of the interaction of CS and emotions

Direction	Interaction	CS to L1	CS to L2	CS
E to CS	When feeling emotional	1, 3, 5, 11, 12, 14, 16	1, 3, 19	10, 18
CS to E	To express certain emotions	3, 16	2, 4, 6, 7	10, 17,
	To distant/control emotions	1, 3, 16	1, 3, 4, 19	10, 17
	To link/feel emotions	1, 16	1	
	To provide affective support			9, 15, 17
	To negotiate emotions	1	1, 2, 4, 7	8, 13, 15, 17, 18
	To show affective stances			10
	To emphasis emotion		7	10
	To create emotional effect on others/ to connect emotions			18

E = Emotions

The majority of emotions linked to CS found in reviewed studies were negatively charged (7 out of 9). The most common emotions related to CS was anger (mentioned 6 times), followed by embarrassment (4 times), and frustration (3 times). Compared to switching to L1, switching L2 had relatively higher frequency found to be related to emotions (13 vs. 10). Switching to L1 was often related to anger and frustration, while switching to L2 was often related to anger, embarrassment, and love. Frustration and proud were only found related to L1. Anxiety and love were only found linked to L2.

Figure 10. Emotions found related to CS



4.2 Study summary

The above section showed that all selected studies in this review were published from 2015 to 2023, and more than half of them were conducted in Asia. Among these studies, 13 of which involved human participants, mainly with a focused age group and the sample size ranged from 4 to 217. Equal numbers of qualitative and quantitative studies were retrieved, with 5 mixed methods studies. Most of the studies were analyses of actual language data and the rest were recollection of language experiences. More than half of the results indirectly revealed the interaction of CS and emotions, of which reasons or functions of CS was the most common outcome.

The next section will move to details of individual studies and narrative summaries of each study will be presented.

4.2.1 Narrative summaries of individual studies

1. **Vaschetto and Martos-Perry (2016)** conducted a quantitative, cohort-based, correlational study to explore how bilingual identity is related to language switching. They recruited 105 participants who spoke both Spanish and English. Participants acquired Spanish around the age of 2 and English around the age of 5, and they had

similar proficiency in English but varied proficiency in Spanish. Participants were asked to complete a questionnaire about affective situations where they used language switching and their switching tendencies. The analysis revealed that the overall switches were significantly correlated to all affective situations ($p<.01$), except for the situation "I have awareness of when I change languages to handle my feelings". The rest of the situations all had medium to large correlation, especially the situation when people felt emotional ($r=.591$) and when people were wanting to better express their emotions ($r=.592$). In two cases, people showed a higher tendency switching to L1, "I choose my language to feel most like myself" ($r=.258$ vs. $r=.087$) and "I choose my language in order to handle my feelings" ($r=.306$ vs. $r=.229$). In another two cases, they showed a higher tendency switching to L2, "I change my language when I am feeling emotional" ($r=.514$ vs. $r=.228$) and "I change my language to better express my emotions" ($r=.537$ vs. $r=.278$). In the Open-Ended questions, participants mentioned a few situations in which they code-switcheed and they were mainly strong, abrupt, and negative emotions. For instance, during an argument, they would get mad, feeling fear, worry, or anger. The author concluded that people CS for both intrapersonal (to express and manage emotions) and interpersonal (to accommodate the listener and the context) reasons.

2. **Nafa (2018)** qualitatively assessed the affect stance indicated by code-switching among five non-UK born Arabic-English bilingual females with high proficiency in English. She focused on the interpersonal perspective of CS and explored it through multiple ethnographic methods and within various contexts. She identified the two most common affect stances: to express feeling toward an incident or an object, and to express feelings about carrying out a certain task or willingness to do a task. She concluded that people switched to English or their L2 to address or acknowledge their emotions due to the difference in perceived social meanings and values. She also argued that CS was a sign of "emotional acculturation" that people gradually modify and adjust their reactions to, and an expression of emotional situations when they socialise to the host community.
3. **Trede (2017)** conducted a qualitative heuristic research about clients' perspective in

bilingual psychotherapy. She interviewed 10 Spanish-English bilinguals on their experience in therapy and extracted various themes based on content analysis. Among these themes, three indicated the interaction between CS and emotions. First, most participants claimed they could express themselves with more confidence, assurance, and power in their L1, Spanish. Second, most participants mentioned that they CS depending on their emotional state. People tended to express intense emotions in Spanish and felt more connected to their emotions and thoughts when speaking L1. The third theme showed that people CS to avoid emotional break down or getting overly emotional. However, the language they switched to was not necessarily the L1 or L2, but the language did not encode the emotional experiences or relationships. Overall, this study indicates more intrapersonal purposes of CS within counselling context.

4. **Su (2018)** conducted a corpus analysis in 30 Chinese web novels to assess different functions of CS. She identified five functions and three of them were linked to emotions. One function of CS was act as a euphemism to discuss taboo words, like sex, body parts, and blasphemy which were also often used to express strong emotions. Another function was to avoid embarrassment when conveying emotions. She argued that it was emotionally easier for native Chinese speakers to express emotions in English. The third function was to mark emphasis to express strong emotions, like anger and surprise. In this study, however, Su did not distinguish English words from Chinese pinyin or acronyms based on pinyin, nor borrowing and code-switching, which may bias the significance of functions of CS. Moreover, although this was a quantitative study, Su did not present any statistical evidence when assessing the functions of CS. This also led to questions on the percentage of CS in different functions.
5. **Sánchez and García (2020)** performed a corpus analysis based on a short story "Invierno" written by a Latino author Junot Diaz. This novel was written in English with a few code-switches to the author’s as well as the characters' L1, Spanish. The researchers identified all CS and compared them to the affective norm list in Spanish (Hans Stadthagen-Gonzalez et al., 2017) to assess differences in language emotionality. They found 3 inter-sentential CS, 2 intra-sentential CS, and 14 tag-switching. Among the 19 CS, 12 were emotionally charged, including all intra- and inter-sentential CS.

These CS were used to signal various emotions or affect stance such as disapproval, embarrassment, astonishment and surprise, and criticism. The researcher concluded that the author consciously switched the language to L1 to reaffirm his as well as his characters' identity and to demonstrate their changes in language emotionality. It may also indicate cultural and affective connotations associated with the language.

6. Alhourani (2018) conducted a qualitative analysis on four Arabic-English students to explore functions of CS. One of the functions he identified was to express feelings. He displayed an excerpt in which one of the participants code-switched to English and said "I love you" to his friend through a phone call when discussing his poor math grade. The author argued that CS was used to express love and appreciation, and English words had a greater impact on the listeners.
7. Hadour (2022) investigated the reasons and functions of CS on Twitter. He focused on French-English tweets by users geolocated in France and filtered 744 tweets to analysis. He found that 55.4% of CS tweets related to feelings. The most frequent switched codes were "OMG" (N=43), followed by "love" (N=23), "crush" (N=21), "yes" (N=15), and "WTF" (N=13). He suggested that "OMG" and "WTF" were often used since they could convey multiple emotions, like surprise, intensity of feelings, or exasperation, in only three letters. He also argued that these two words were used to convey a degree of vulgarity that did not exist in French, which could also reduce emotional force.
8. Carstens and Hoon (2019) assessed the function of each code lexemes used in CS conversations among Malaysia. They analysed 12 conversations by bilingual or multilingual speakers of Chinese, English, and Malay. They found that Chinese lexemes in CS conversations were mainly used to express emotions compared to English and Malay (N=39, 21, 10). They suggested that Chinese topolects were more emotional than the other two languages, maybe due to the frequent exposure to the language in childhood or the dominance of Chinese.
9. Tale and Alqahtani (2020) assessed students' perception regarding CS versus target-language-only classroom on their affective sustenance in EFL reading comprehension. They applied a questionnaire to 52 female Saudi students who were beginners in the English department. Through paired-samples t-test, they found that CS was perceived

to be providing more affective sustenance than an English-only classroom (p=.000). Students reported more confidence, enjoyment, satisfaction, comfort, less stress, and feeling more supported and less lost in CS classroom.

10. Carstens and Hoon (2019) investigated the function of CS in disagreement conversations between bilingual or multilingual couples in Taiwan and UK. They recruited 21 couples and asked them to record their daily conversations. One of the findings showed that CS was used to take affective stance. Couples used it to highlight emotions, increase affective intensity, express surprise, show alignment or disapproval, and express affective proposition. They concluded that CS was an important interpersonal strategy in communication and acted as a contextual cue. They further argued that CS was dynamic and served different functions under different situations.
11. Rudra et al. (2016) conducted a quantitative analysis on Hindi-English tweets to explore the function of CS in terms of expressing sentiments. They built a corpus of over 40 thousand tweets across four domains: sports, entertainment, politics, and events. Then, they applied multiple classifiers to distinguish CS tweets (N=3,357) and sentiment words. The correlation analysis showed a strong tendency of switching to L1 for negative sentiment and to L2 for positive sentiment. They also found a higher fraction of swearing in Hindi than in English among CS tweets. They therefore concluded that CS to L1, Hindi, signalled a switch to negative sentiment.
12. Yarzebinski et al. (2015) explored the function of CS to artificial intelligence when providing self-explanation of algebra problem solving in primary school. They found a statistically significant difference between the number of positive and negative CS self-explanation, with a preference of switching to L1 to express negative sentiments. They also mentioned that students were aware that the artificial intelligence did not understand their first language. They explained that students CS to face threat reduction, to express frustration with their own knowledge, and frustration with their partner. They further suggested that the CS was not only for interpersonal functions, but also related to individual abilities and meta-cognition.
13. Rolland et al. (2017) conducted an international online survey to investigate bilingual and multilingual clients' language practice in counselling and psychotherapy. They

collected 109 valid responses from clients of 42 countries and found nearly two thirds of clients had CS in their counselling. Among them, 48 clients reported that they CS to express emotions, while no one reported using CS to control emotions nor avoid cultural taboo. Clients further described their CS reasons in open-ended questions. They reported that they tended to quote painful phrases from others that they experienced in childhood, like recites, and they could deeply relate to their emotions if using the exact phrases in the language. Meanwhile, they also mentioned that their childhood memories could be more easily evoked if using the language encoding the event. However, contrary to the questionnaire, some clients also reported that they used CS as a function to distance aversive experiences and protect themselves from exposing their inner selves. These findings suggested an intrapersonal interaction of CS and emotions.

14. Sánchez and García (2020) did a corpus and discourse analysis on a Spanish-English character in three short stories written by a Latino author Junot Diaz. They identified three types of CS, intra-sentential, inter-sentential, and tag-switching. All three types of CS were associated with emotional events. The character switched to Spanish when he felt emotional and when the situation was emotional. He also switched to Spanish to express emotions like anger or embarrassment. Researchers concluded that those CS words had a positive bias for valence and a negative tendency for arousal. The preference of using L1 to express emotion did not change even when the character progressively adopted English into his life.

15. Nawaz et al. (2023) applied a questionnaire to explore learners' perceived support of CS in EFL classroom. They recruited 100 students who were learning English in University. Results showed that the majority of students agreed that CS was helpful in expressing emotions and only 5% of students disagreed with it. Overall, CS was perceived to be providing affective support to students in EFL classroom through by boosting their confidence, fostering their motivations, and making them comfortable. Researchers also did a correlational analysis to examine students' affective states and teachers' application of CS. By combining five factors, "CS helps to enjoy learning", "…to feel satisf"ed", "...to feel comforta"le", "...to be more attent"ve", a"d "...to boost

up confide”ce", into a general measure of affective states, they found a statistically significant relationship between learners' affective states and teachers' application of CS in EFL classroom.

16. Hammoud (2020) adopted a sociolinguistic approach to analysis the novel Brick Lane written by a second-generation immigrant author, Monica Ali. Three characters were focused on in the study and their purposes of CS were analysed. Hammoud noticed that these characters linked their L1 with positive feelings and they tended to quote in their L1 when felt stress or frustrated. Meanwhile, they also switched back to their L1 to express anger. Hammoud argued that this was a way to create barriers and psychological distance, and empower themselves by their mother tongues.
17. Erol (2022) conducted a mixed method research on Turkish-English students and teachers to explore their thoughts of CS in EFL classroom. They recruited 217 high school students with different levels of English proficiency to complete a questionnaire, and interviewed 12 students and 4 English teachers. Descriptive results of the questionnaire showed that nearly half of the students agreed that CS was a way to express personal emotions, such as anger, sadness, and happiness. However, about one third of students disagreed with this point, and the rest were not sure about this. Around 60% of students also agreed that CS could decrease their anxiety while speaking. Both students and teachers mentioned in their interview that CS could reduce anxiety. Students also reported the emotions expression function of CS. They also found a positive correlation between CS frequency and learners' proficiency levels, age, and experience of being abroad.
18. Ng and Lee (2019) conducted an online ethnography study to examine multilingual young adults' language use. They recruited five Chinese/Malay-English multilingual adults who were willing to provide their formal digital communication data from ther workplace and informal data on Facebook or WhatsApp. By analysing the content, researchers found that CS interacted with emotions both intra-personally and interpersonally. Compared to the workplace where CS was restricted, participants could CS more freely in informal settings. Participants automatically switched to their mother tongue when feeling fear or surprise, and they unconsciously adopted expressive words

from their L1. However, those expressive words were relatively short, such as “Eh”, “Meh”. CS also allowed them to incorporate their language experience, cultural, and personal background while expressing emotions. Meanwhile, CS was used to create an emotional effect on their interlocutor to connect emotions. Ng and Lee concluded that participants CS when they felt comfortable with the topic and the audience, and also when they felt confident about themselves.

19. Ladegaard (2019) collected actual language data from 107 domestic migrant-workers in Indonesia and Philippines to investigate the interaction between CS and language emotionality. By asking participants to narrate their work experience, Ladegaard noticed that they often switched to English when they felt emotional, or the topic was emotional. He suggested that participants altered their language when they were unable to find the right word to capture the emotional experience, especially when the experience was traumatic and difficult. Participants were also noticed switching to English when they felt embarrassment. In these cases, CS was used to manage their emotions to avoid overwhelm. Both intra-sentential and inter-sentential CS were found in the discourse. The intra-sentential CS was argued to be more emotionally charged as they were not premeditated. Ladegaard concluded that CS was used to form their personalised emotion scripts and was therefore a way for emotional alignment. During the process, the language used to encode experience would impact its emotionality, the level of emotional texture and complexity, and eventually, influenced speakers' behaviours.

4.3 Quality assessment

Table 6 displayed the risk of bias (RoB) ratings of each individual studies assessed using MMAT. Regarding overall weight of evidence, 7 studies (Chi, 2016; Hadour, 2022; Ladegaard, 2018; Rudra et al., 2016; Sánchez and García, 2020a; Sánchez and García, 2020b; Trede, 2017;) received a ‘strong’ rating, 6 studies (Erol, 2022; Hammoud 2020; Nafa, 2018; Nawaz et al., 2023; Ng and Lee, 2019; Yarzebinski et al., 2015) received a ‘moderate’ rating, and the remaining 6 studies (Alhourani, 2018; Tale and Alqahtani, 2020; Carstens and Hoon, 2019; Rolland et al., 2017; Su, 2018; Vaschetto and Martos-Perry, 2016) received a ‘weak’ rating.

In subsections 4.3.1 to 4.3.3, the overall component ratings for the quantitative, qualitative, and mixed methods designs will be reviewed. An assessment of the cumulative confidence across reviewed studies will be described by the end of this section.

4.3.1 Quantitative studies

Quantitative studies were all assessed by MMAT using the quantitative descriptive section. Within the 7 quantitative studies, 3 received a "strong" rating (Hadour, 2022; Rudra et al., 2016; Sánchez and García, 2020a), 1 received a "moderate" rating (Nawaz et al., 2023), and the other 3 received a "weak" rating (Tale and Alqahtani, 2020; Su, 2018; Vaschetto and Martos-Perry, 2016). "Yes" was the most common response for sampling strategy, low risk of nonresponse bias, and statistical analysis appropriateness. For measurements appropriateness, "Yes" and "Can't tell" had equal responses of 3. Sample representativity had evenly distributed responses.

Most studies provided appropriate sample strategies while the rest 3 studies had restricted information of how they recruited participants, leading to a moderate risk of bias (No. 4, 9, 15).

Two studies (No. 1 and 9) had high risk of bias of sample representativity. Vaschetto and Martos-Perry (2016)'s target sample was Hispanic/Latino Spanish-English bilingual, but the final sample consisted mixed ethnicities and people had no history of using Spanish. Tale and Alqahtani (2020) only recruited female students due to cultural constraints. Study 4 only selected the most popular novels of each category in the analysis (Su, 2018), and study 15 (Nawaz et al., 2023)

Table 6. Risk of Bias of individual studies based on MMAT

Study ID	Qualitative					Quantitative Descriptive					Mixed Method					Global strength of evidence rating	
	Rationale for approach	Collection methods	Findings derived from data	Interpretation substantiated by data	Coherence between data sources, collection, analysis and interpretation	Sampling strategy	Sample representativity	Measurements appropriate	Low risk of nonresponse bias	Statistical analysis appropriate	Rationale for approach	Components integration	Results into overall interpretations	Divergences and inconsistencies addressed	Adherence to quality criteria		
1	--	--	--	--	--	✓	×	△	△	✓	--	--	--	--	--	Weak	
2	✓	×	✓	✓	✓	--	--	--	--	--	--	--	--	--	--	Moderate	
3	✓	✓	✓	△	✓	--	--	--	--	--	--	--	--	--	--	Strong	
4	--	--	--	--	--	△	△	×	✓	×	--	--	--	--	--	Weak	
5	--	--	--	--	--	✓	✓	✓	✓	✓	--	--	--	--	--	Strong	
6	✓	×	△	×	×	--	--	--	--	--	--	--	--	--	--	Weak	
7	--	--	--	--	--	✓	✓	△	✓	✓	--	--	--	--	--	Strong	
8	✓	△	△	△	×	△	△	△	△	✓	✓	△	△	△	×	Weak	
9	--	--	--	--	--	△	×	△	△	✓	--	--	--	--	--	Weak	
10	✓	✓	✓	✓	✓	--	--	--	--	--	--	--	--	--	--	Strong	
11	--	--	--	--	--	✓	✓	△	✓	✓	--	--	--	--	--	Strong	
12	✓	△	✓	✓	✓	△	△	✓	△	✓	✓	✓	✓	△	△	Moderate	
13	✓	△	△	△	△	△	△	△	△	✓	✓	△	△	×	△	Weak	
14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	△	✓	Strong	
15	--	--	--	--	--	△	△	✓	△	✓	--	--	--	--	--	Moderate	
16	✓	✓	✓	△	△	--	--	--	--	--	--	--	--	--	--	Moderate	
17	✓	△	✓	△	✓	△	△	✓	△	✓	✓	✓	✓	△	△	Moderate	
18	✓	△	△	✓	△	--	--	--	--	--	--	--	--	--	--	Moderate	
19	✓	✓	✓	✓	✓	--	--	--	--	--	--	--	--	--	--	Strong	
Yes (✓)	12	5	8	7	7	5	4	5	5	11	5	3	3	0	1	7	Strong
No (×)	0	2	0	1	2	0	2	1	0	1	0	0	0	1	1	6	Weak
Can't tell (△)	0	5	4	4	3	7	6	6	7	0	0	2	2	4	3	6	Moderate
Total	12					12					5					19	Total

did not provide enough information of their sample, therefore had moderate risk of bias. Study 5 only focused on one story and was able to assess all target population. Study 7 and 11 provided adequate information of approaching their target sample.

Only one study (No. 4) exhibited high risk of bias on their measurements of variables. Su (2018) counted any continuous alphabet characters as a case of code-switching, which did not distinguish Chinese pinyin and acronyms based on pinyin and may mislead the proportion of CS investigated by this review. Study 1, 7, 9, 11 did not give clear definition or criteria of their measured variables and thus were rated with moderate risk of bias. Study 5 provided appropriate criterion of how they measured CS and affective words.

Most of studies (4, 5, 7, 11) were analyses of literature or selected texts and therefore the nonresponse bias was not necessary for them. The rest studies (1, 9, 15) did not include information regarding the non-respondent and therefore cannot tell their risk of nonresponse bias.

In terms of statistical analysis, study 4 was rated with high risk of bias since it did not provide any statistical evidence to support his research question. The remaining studies all supported their research questions statistically.

4.3.2 Qualitative studies

Qualitative studies were assessed in the relevant section of the MMAT. Study 3, 10, 19 received a “strong” rating of RoB, study 2, 16 and 18 were rated with a “moderate” RoB, study 6 had a “weak” rating of RoB. All the 7 studies presented adequate rationale for pursuing a qualitative design. “Yes” was the most common response for all the five categories.

Most of studies offered clear and sufficient process of data collection. Study 2 and 6 were rated with high risk of bias on data collection since the selection of data source was highly subjective or obscure and the sample size was relatively small. Study 18 only assessed the data

provided by participants who did not consider the confidentiality of formal working message, which may result in misleading data source and was thus received a moderate rating.

Regarding the findings derived from the data, study 6 did not give a clear explanation on their analysis logic and the risk of bias were unable to tell. The rest studies gave enough details on their analysis procedures.

With respect to interpretation, study 6 only provided very limited data to support their interpretation, and therefore were rated with high risk of bias. Study 3 and 16 provided more data but still gave insufficient examples to support their interpretation and were rated with a moderate risk of bias. The remaining studies showed relatively logical explanation on their data.

Study 6 jumped to a rather general conclusion with a small sample size and limited data, which led to a high risk of bias in coherence. Study 16 selectively drew data and presented ambiguous explanation. Study 18 occasionally quoted non-target, underexplained variables (i.e., emoticon) in interpretation. These two studies were rated moderate coherence bias. The other 4 studies linked their steps in a logical way.

4.3.3 Mixed methods studies

Study 15 was the only mixed methods study rated with low risk of bias. It provided clear definition of measurements and efficiently combine both qualitative and quantitative data to answer their research questions.

While study 12 and 17 did not offer enough details on their sample features and collection methods, which led to moderate risk of bias on sampling strategy and sample representativity, they provided clear explanation on their analyses and their interpretations of both qualitative and quantitative data were coherent and appropriately supported their research questions. Thus, these two studies received moderate rating on RoB.

The rest two studies were considered high in RoB. Study 8 provided little description of the quantitative part of their study. The data source was selected deliberately from a previous study and did not provide enough details, led to a moderate collection bias. It presented relatively clear explanation on the analysis logic but not sufficiently convincing to support their interpretation. The overall coherence was low due to a poor integration of the qualitative data and quantitative data. Study 13 presented limited information on their qualitative data. In the quantitative part, little information was provided regarding the design of questionnaire, and their data collection method was not fully anonymous. Enough description on their sample features were provided although not in a concise presentation. The interpretation of qualitative and quantitative data was not coherent and did not address the divergences between results.

4.3.4 Cumulative confidence across studies

The proportion of "strong", "moderate", and "weak" global strength of evidence rating was relatively even (7:6:6). Of all aspects assessed, collection methods/sampling strategy, sample representativity, and coherence of evidence were the biggest source of bias. Most studies failed to provide a clear explanation on their sample features or had questionable approaches to participants. However, as the research question of this review focused on the interaction of CS and emotions, and most ambiguities of samples did not have a direct impact on the intended measurements. In some qualitative studies, the analytical methods were not supported with clear theoretical framework and the interpretations were not based on sufficient data, which led to weakness in coherence. However, due to the subjective nature of qualitative research, most interpretations were based on social norms and personal experiences, which were inevitable parts to judge language use as mentioned in section 2.2 and 2.3. Therefore, this group of studies overall has a moderate to strong strength of evidence.

4.4 Review of overall results

The final section will provide a preliminary answer to the research questions with regards to the findings described above. Further in-depth analysis will be provided in the Discuss chapter.

RQ1: If the occurrence of code-switching is associated with affective events? What functions do CS serve in the affective events and what kind of emotion is underlying CS?

All 19 studies demonstrated an association between CS and affective events – they interacted with each other both intra-personally and interpersonally. In terms of the functions of CS in operating emotions, switching to a specific language was found mainly due to intrapersonal reasons, such as to express emotions or to either move forward to or distant from certain emotions. Compared to switching to certain language, the ability to employ two or more codes in a conversation served specific intrapersonal and interpersonal functions, such as to provide affective support, to show affective stances, and to create emotional effect on others.

Regarding the influence of emotions on CS, most studies revealed that people tended to CS when feeling emotional, as displayed in table 5. Several emotions were often found related to CS, such as anger, surprise, and embarrassment. Most emotions were highly arousal and negatively charged. While studies showed that people may switch to either L1 or L2 when feeling emotional, more studies illustrated a preference switching to L1. Although only four studies mentioned that people sometimes switched codes unconsciously when feeling emotional or discussing emotional topics, this may also evident the influence of emotions on CS.

RQ2: Is there any cross-linguistic/cultural difference on the interaction between CS and emotions?

Across the 19 studies, 12 were conducted in Asia, 7 were in western countries, and 2 were based online. Thirteen studies involved participants originally from Asia and had English as their L2/LX, the rest studies had participants from western countries and English as their L2/LX. This review was planned to categorize language background based on cultural background and language experience, as described in section 2.2 and 2.3. However, due to the lack of information on sample features, language experiences were unable to assess. Therefore, this

review will only assess cross-cultural differences based on two cross-cultural types – western-western (W-W) (1, 3, 5, 7, 13, 14) versus eastern-western (E-W) (2, 4, 6, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19).

In the W-W type, 3 studies were based on actual language data (5, 7, 14), 3 studies were recollection of language experience (1, 3, 13). CS was used to manage, express, emphasis, and negotiate emotions, and they CS when feeling emotional. Anger, sadness, embarrassment, and surprise were related to both switching to L1 and L2. Frustration and proud were uniquely linked to switching to L1 while love, fear, and anxiety were uniquely linked to switching to L2.

In the E-W type, only 3 studies were recollection of retrospective memories (9, 15, 17) and the rest 10 studies were all based on actual language data. Addition to W-W type, CS was found with additional functions in E-W participants. It had one more intrapersonal function as a way to provide affective support, and two more interpersonal functions, to show affective stances and to create emotional effect on others/to connect emotions. In terms of the emotions related to CS, participants of E-W were similar to W-W. Frustration and anger were found linking to switching to L1, anger, embarrassment, surprise, and love were found linking to switching to L2. Overall, compared to western culture, people from eastern culture are more likely adopting CS for interpersonal purpose. The ability to switch between code could provide them affective support and reduce language anxiety.

RQ3: Is there any cross-modality difference on the interaction between CS and emotions?

Of the 19 reviewed studies, 16 of them had a clear modality of interest. The number of studies investigating writing and speaking CS were equal, study 4, 5, 7, 11, 12, 14, 16, 18 focused on writing CS and study 2, 3, 6, 8, 9, 10, 13, 19 focused on speaking CS.

Most studies on writing CS assessed the interaction of switching to L1 and emotions (5, 11, 12, 14, 16). Participants tended to switch to their first language when feeling emotional,

stressful, or threatened. They also preferred to use their L1 to express anger. Only one study showed emotion management function of CS. Participant in study 16 switched to L1 to link to emotions and to create a psychological barrier from painful experience happened in L2. However, this was a study of literature, and the character performed speaking CS though being written by the author. Two studies (4, 7) focused on switching to L2 and found that participants tended to switch to L2 to negotiate certain emotional material (i.e., taboo) or to emphasis their emotions. Study 18 investigated CS as a whole and showed an additional affective function that was to create emotional effect on others.

With respect to speaking CS, only one study (3) involved an investigate in switching to L1 and emotions. People switched to L1 during speaking to better negotiate emotions, distant from painful experiences happened in L2, and when feeling emotional. It was also found to express sadness, anger, proud, and frustration. Four studies focused on switching to L2 and its interaction with emotions (2, 3, 6, 19). To move away from overwhelming emotions or difficult emotions such as embarrassment was the most common function of CS. Meanwhile, switching to L2 also led to anxiety. Study 8, 9, 10, 13 investigated CS as a whole and found it was used to show affective stances and to provide affective support, which were unique to writing CS. The emotionality was similar across modality while speaking CS showed more interpersonal and intrapersonal functions than writing. The overall cross-modality difference on the interaction is not salient in this review.

Chapter 5. Discussion

This chapter will discuss in-depth the research findings and link them back to research questions. Then, it will describe limitations of this review and provide suggestions for future studies.

5.1 Response to research questions

This review analysed research from 2014 that investigating any interaction between code-switching and emotions. A total of 19 papers were analysed and showed moderate to high evidence quality. Both actual language data and recollection of memory were included in the analysis. Analysis of actual language data could demonstrate direct evidence on language behaviours, while retrospective questionnaire could reflect people's individual perception on their language use. The combination of both types of data could provide a complete view on the research questions.

5.1.1 Research question 1

"If the occurrence of code-switching is associated with affective events? What functions do CS serve in the affective events and what kind of emotion is underlying CS?"

All studies demonstrated the interaction of CS and emotions. From the perspective of CS on emotion, 8 functions were identified. The expressive functions were the most common function of CS on emotions, followed by emotion management and interpersonal interaction. From the emotional effect on CS, more than half of the studies found that people tended to CS when emotional. The majority of emotions were negatively charged with high arousal. Anger was the most frequent emotions related to CS. Some studies suggested an unintentional CS.

These findings confirm that language is closely related to emotions and could be used as a method to operationalize emotions (Lindquist and Barrett, 2008). While for monolingual people,

language competence is positively associated with their ability to interpret and manage emotions (Streubel et al., 2020), multilingual people's affective ability is further influenced by their acquisition of the additional languages (Dewaele, 2010a). Contradict to the language embodiment theory that L1 normally has strong emotionality and L2/LXs have weaker emotionality, recent findings emphases the importance of language experience. As the acquisition of emotion lexicon could facilitate the encoding and decoding of emotions, the context where people learn the language and experience of using the language will shape their emotional concepts and perception toward the language (Dewaele, 2010a). With different language experiences, people associated their memory of emotional events and the language encoding the events and gradually assigned different emotionality to each language. However, a preference for using L1 in emotional events is still noticed (Deweale, 2010b), which may suggest the strong impact of childhood language experience on later language use.

Nonetheless, people's choice of language in affective events is not only based on language emotionality, but also motivated by their purpose. From intrapersonal perspective, in highly emotional situations, people choose to switch back to the language with less emotionality to give space from the emotion and avoid being overwhelmed (Ladegaard, 2018; Trede, 2017). People also choose to express emotions in language with less emotionality to avoid or distant from negative emotions, such as embarrassment and sadness (Hadour, 2022). In turn, people also switch to high emotionality language in positive emotional events to deeply relate to the emotions (Hammoud, 2020). However, as suggested by previous studies (Deweale, 2010a), certain vocabulary was related to their emotional memory and are more likely to be retrieved through the language. Retrieval to memory using the other language may lead to higher frequency of CS. Such in the case of Ladegaard (2018), participants' adoption of CS may be due to a conflict in language use and the language of encoding.

From interpersonal perspective, the language of audience and relationship between interlocutors have a great impact on CS. Normally, people code-switching in a familiar environment with people of close relationship (Deweale, 2010). Most of reviewed studies also focused on contexts where interlocutors were familiar with, such as in counselling session

(Trede, 2017) or in classroom (Erol, 2022) or with friends and family (Carstens and Hoon, 2019). The switch to different languages could show affective stances to the audience (Chi, 2016), help to emphasis the intensity of emotions (Chi, 2016; Hadour, 2022), and to affect others' emotions (Ng and Lee, 2019). Meanwhile, the ability to freely choose between languages allows people to find the best expression of their emotions and to better negotiate emotions with other (Trede, 2017).

Context is an important factor in the use of CS. Across the 19 studies, 4 contexts were repeatedly investigated: classroom, counselling, social media, and literature. In classroom, CS was often associated with providing affective support (Tale and Alqahtani, 2020; Erol, 2022; Nawaz et al., 2023). People mentioned that speaking English (their L2/LX) was associated with anxiety and fear (Trede, 2017). It is a common phenomenon in second language learning class where students often have communication anxiety (Dewaele, 2015). The ability to use L1 could provide them with confidence and affective support in class. This is echoed by research which shows that the use of L1 in English as Foreign Language (EFL) classroom could help teachers build a close relationship with students and provide them a feeling of belongness (Cahyani et al., 2018). Pedagogical research also finds that the combination of L1 and L2/LX in school is more likely lead to students' better school performance (Valentino & Reardon, 2015). Moreover, positive emotions in classroom were found linking to higher academic performance in foreign language learning (Dewaele et al., 2018). The interaction of CS and emotions found in this review may have implications on research in EFL classroom. The affective part should be noticed by teachers. Moreover, teaching of vocabulary may try to activate students' emotions since emotions are encoded by language and could lead to more memorable emotional lexicon (Pavlenko, 2008).

Another common context was in therapy (Ladegaard, 2018; Rolland et al., 2017, Trede, 2017). Although participants in Ladegaard (2018) were not clients, they suffered from traumatic experiences and were approached for social support. Psychotherapy is often considered highly emotional, and bilingual therapy has been concerned for its treatment efficiency influenced by clients' and therapists' language use (Dewaele et al., 2013). The application of solely clients'

second language may suggest a distance to therapists and a weak relationship (Foster, 1998). Participants mentioned that they tended to switch to L2 to escape from difficult emotions or to avoid overwhelmed (Ladegaard, 2018; Trede, 2017). They also suggested that the ability to use their L1 made them feel being supported (Trede, 2017). These findings were aligned with previous findings in bilingual therapy. However, it is impossible for all clients to find a proper bilingual therapist. The interaction found in this review suggests that therapists should pay attention to multilingual clients' language experience and language behaviour in counselling to better connect with them.

On the other hand, emotions are also one of the factors that affect the onset of CS. Some studies mentioned unintentional switches, especially with abrupt, intensive, and negative emotions, like anger and sadness (Ladegaard, 2018). It happened even in situations where the audience did not speak the language (Trede, 2010; Vaschetto and Martos-Perry, 2016). This is in line with studies on bilingual people's cognitive control. According to Green (1986), bilingual people's two languages are both activated on cognitive level and their inhibition is always turned on to prevent the producing of the other language while using one language. Negatively charged emotions, such as anxiety (Ouzia and Filippi, 2019), were found occupy cognitive resources and reduce the inhibition. This may result in a loose control of language production and eventually lead to unconscious CS, i.e., slips of the tongue (Green & Abutalebi, 2013). A negative intensive emotional situation therefore may affect the control of languages and result in CS. In addition, the lack of positive emotions identified in reviewed studies may confirm that positive emotional states could lead to an increased cognitive control (Cohen et al., 2016). This is also echoed by Tomic et al. (2020), in which the processing of code-mixed context was found reduced people's emotional arousal. This suggests that the access to both languages requires cognitive source and will competing with the process of emotions. Overall, negatively charged, high arousal emotions most likely lead to CS.

5.1.2 Research question 2

"Is there any cross-linguistic/cultural difference on the interaction between CS and

emotions?"

As described in 2.2, different languages and cultures have different emotion concepts and emotion lexicon (Pavlenko, 2008). Sociocultural and familial factors also influence people's emotional development (Chen and Zhou, 2019). Language background and cultural background, therefore, are two major factors that may influence learners' language experience, which eventually has an impact on their emotion operation. This review categorized participants' according to general geological features – eastern versus western countries. More than half of reviewed studies including participants from eastern cultures learning English (E-W), the rest studies involved people learning English from western countries (W-W). By comparison, the major difference between E-W and W-W was that people of E-W applied CS to provide affective supports. This is related to the language anxiety in EFL classroom mentioned above (Dewaele, 2015). Most eastern cultures are rather conservative compared to western cultures (Chen and Zhou, 2019), and this may lead to concerns when E-W students practice English as they may feel being exposed. Further studies on cross-linguistic/cultural difference effect should try to assess participants' language proficiency, context and age of acquisition, and language dominance as these factors are influential on people's language choice (Dewaele, 2010a). Moreover, quantitative studies on cross-linguistic differences in emotion lexicon are expected to support the analysis.

5.1.3 Research question 3

"Is there any cross-modality difference on the interaction between CS and emotions?"

Compared to speaking, writing involves more attentional control and is more consciously aware. Half of the studies focused on writing CS. However, there was not a clear difference between affective functions nor emotion types between the two modalities. A direct comparison between writing and speaking CS is required to further understand the influence of modality on its interaction with emotions.

5.2 Limitations

One of the limitations is about the review process. First, the protocol of this review was not

registered before the submission, and only one reviewer was in the searching and screening processes. These two factors may lead to selection bias. Second, within the selection process, only studies within 10 years and published in English were included due to limitations on the reviewer. Older studies and studies in other languages should be included to better complete the picture. Regarding the quality of studies selected, the major issues are the ambiguity of collection procedure and varied definitions of CS and emotions. Issues with data collection restricted the analysis and the inconsistency led to a rather weak conclusion. Further studies with more language backgrounds and other linguistic focuses should be conducted.

5.3 Conclusion

This systematic review found that code-switching and emotions were closely related, and the interaction was dynamic. CS was often used to express and manage emotions. Negatively charged and high arousal emotions had the most impact on the onset of CS. Further studies should pay attention to the language emotionality and personal language experiences.

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Appendix A. IDESR protocol

Review Question(s)

1. Is the occurrence of code-switching associated with interlocuters' emotions? a) Which emotion is most associated with code-switching? b) What is the function of code-switching as it relates to emotions? c) Is the behaviour intentional or unintentional? 2. Does emotional state affect the frequency and pattern of code-switching? 3. Do patterns of emotionally informed codeswitching differ depending on mode (written vs. spoken)?
Provide the review questions. For reviews of interventions, include reference to PI(E)CO, as appropriate (Participants, Intervention (Exposure), Comparator, Outcomes). Examples: What are the effects of study abroad compared to classroom teaching on vocabulary acquisition among adolescent learners of a foreign language? *Or* What is the impact on academic attainment of attending a bilingual school compared to a target language only school among minority language users?

Rationale

Code-switching, the behaviour of altering linguistic elements from two languages (Muysken, 2000; Nilep, 2006), has drawn more attention with the increasing number of bilingual speakers worldwide. While some studies suggest that code-switching (CS) is a scaffold to learning L2 and is associated with L2 proficiency (Sinclair & Fernández, 2023), others focus on the emotional elements underpinning languages alternation (Calvillo, Fang, Cole, & Reitter, 2020; Shi et al., 2023; Ladegaard, 2018). Previous studies propose an emotional distance between the first language (L1) and the second language or the additional language (L2/LX), as individuals' L1 is normally associated with stronger emotions than their L2/LX (Shi et al., 2023). Switching to the L2 is therefore suggested to be used as a method to detach emotions (Ladegaard, 2018). Code-switching is also found

related to certain emotions such as contempt (Ferreira, 2016), surprise (Calvillo et al., 2020) and embarrassment (Bond & Lai, 2001). Moreover, emotional valance is suggested that improve the advantage switch effect (Shi et al., 2023). However, there is no review that systematically examines code-switching and its relation to emotions. This review, therefore, aims to assess how emotions could is related to the pattern of code-switching.

In no more than 300 words, describe the rationale for the review in the context of what is already known.

Inclusion Criteria

Bibliographic Information

Include 1: Studies with a full reference or sufficient information.

Exclude 1: Studies with insufficient bibliographic information.

Rationale: Without sufficient bibliographic information, retrieval of works is unfeasible.

Date of Publication

Include 2: Published between January 2014 to July 2023.

Exclude 2: Records published before January 2014.

Rationale: To collect studies conducted within 10 years.

Participants

Include 3: Studies that involve individuals of any age who are able to understand, speak or write more than one language or dialect.

Exclude 3: Studies that focus on individuals who can only use one language or dialect.

Rationale: This review seeks to assess individuals' code-switching between languages or dialects and its relation to emotions. People who cannot produce more than one language are unable to code-switch.

Focus of the study

Include 4: Reports of studies that aim to examine the role of emotions in people's language choice, including the affective functions of code-switching, such as to express, distance, or

induce certain emotions; the effect of emotion on language choice; people's emotions or feelings toward language switching.

Exclude 4: Reports of studies which exclusively focus on emotions with no attention to code-switching behaviours; or studies exclusively focus on code-switching behaviours with no attention to emotions. Reports of studies which focus on people's attitudes toward code-switching.

Rationale: This review focuses on code-switching and its relation to emotions, thus related emotional research or code-switching research outside the focus on their interaction will not be included.

Outcomes

Include 5: Studies that report the measure of the association between language switching and emotions as one of their main outcomes. Include studies that report either quantitative or qualitative measures of outcomes.

Exclude 5: Studies that do not report any link between language switching.

Rationale: This review focuses on the relationship between language choice and emotions. A wider focus on links between CS and factors other than emotions, or links between emotions and factors other than language choice is not the focus of this review.

Research design

Include 6: All research designs, quantitative, qualitative, or mixed methods, are included.

Exclude 6: Not excluding any types of designs.

Rationale: This review is interested in all types of approaches in exploring multilinguals' code-switching patterns and their associations with emotions.

Language of publication

Include 7: Studies published in English

Exclude 7: Studies based on the language other than English of publication.

Rationale: Accuracy is not in control if no professional translator available

Publication status

Include 8: Any publication status within the databases selected

Exclude 8: Do not exclude studies based on publication status.

Rationale: This paper seeks to include a wider range of research

List here the criteria to be used for inclusion in the review. As appropriate, include information about the population, interventions, comparators, primary outcomes, setting, study design(s), time frame, publication types, language(s) of publication, etc.

Information Sources

The list of databases consulted for this systematic review can be found below. This list includes prominent databases in the fields of applied linguistics, psychology, as well as multidisciplinary sources to cover wider fields of the social sciences. Furthermore, searches will be conducted on OpenGrey, ProQuest Dissertations & Theses Global, Google Scholar to encompass any grey literature not present in the other databases. All databases are accessed electronically via subscription from the University of Oxford's Bodleian Library.

Applied Linguistics: ProQuest (including ProQuest Linguistics Collection)

Psychology: PsychINFO

Multidisciplinary: Web of Science, Scopus

Grey literature: OpenGrey, Google Scholar

The initial search will be followed by both forward and backward citation searches, whereby the reference lists of all studies that meet the inclusion criteria will be screened for additional potentially eligible studies. These will be screened in the same way as records returned by the database searches. For the forward citation search, where the database or journal website allows, subsequent citations of eligible studies will be similarly reviewed for inclusion.

Describe all intended information sources. Include the names of electronic databases, journals or websites that will be hand searched, contact with study authors, grey literature sources, etc.

Search Strategy

For this study, an experienced librarian at the University of Oxford's Department of Education was consulted to formulate the initial search. The two elements, code-switching and emotions, were identified as the crux that should underpin the search. A number of similar labels were included within each category to capture the variability of terminology in different educational contexts. Different terms within each category were connected with the operator 'OR' and each field was joined with 'AND.'

All terms will be searched for in the title and abstract search:

code-switch* OR code-mix* OR code-alter* OR “code alter*” OR "code switch*" OR "code mix*" OR “language choice*” OR “spoken exchange*” OR “language alter*” OR “language switch*” OR “language mix*”

AND

emotion* OR affect* OR mood* OR feel*

Present the search strategy to be used for at least one electronic database such that it could be repeated by a third party. Include planned limiters, for example, date range, and location in the text (e.g. Title, Abstract, or Full Text). Present these as a Boolean phrase if possible. If Boolean phrasing is inappropriate for your review, present the search strategy in a way that can allow replication by a third party.

Data Management

Papers will be uploaded to Rayyan to deduplicate.

Abstract and Title screening in Rayyan, papers that match the inclusion criteria will be selected.

Full-text screening in Rayyan, papers that match the inclusion criteria will be further analysed.

Data extraction in Excel.
Describe the mechanisms by which the data will be managed throughout the review. For example, say which data management software the review team use, e.g. Rayyan, EPPI Reviewer, Excel, Covidence, etc. Describe if these will change with different phases of the review (abstract screening, full text screening, data extraction, etc.).

Selection Process

N/A
Describe the method by which studies will be selected for inclusion at each stage of the review. For example, how many reviewers will screen abstracts/full texts? What quality assurance procedures will be in place in each of these phases (dual screening of all records, percentage dual screened then checked for consistency, etc.)?

Data Collection Process

Data extraction form / coding sheet will be created to collect essential data items. Data not contained in the reports will be obtained by contacting authors directly.
Describe how data will be extracted from reports. Will a data extraction form be used? Will this be piloted? Will data be extracted independently by multiple reviewers? What is the process for obtaining data not contained in the reports (e.g. contacting authors directly)?

Data Items

1. Participants' demographic information

(a) age

(b) gender

(c) country

2. Study design type

3. Participants' language background:

(a) First language

(b) Second language

(c) L2 Proficiency

(d) Duration of L2 learning or using

(e) Age of arrival/exposure

4. Code-switching patterns:

(a) Content / Topic

(b) Frequency

(c) Type (intra-sentential, inter-sentential, tag-switching)

(d) Purpose/Function

(e) Intentionality

(f) Modality (Speaking, Writing)

5. Emotions:

(a) Type of emotions

(b) Assessment

6. Research context:

(a) Setting

(b) Medium

(c) Object

List and define all data items that will be extracted (e.g. participant info, outcome measures, sources of funding, study design, etc.).

Risk of bias/trustworthiness of individual studies

MMAT
Describe how risk of bias, trustworthiness, or quality of individual studies will be assessed. Name any specific tools, e.g. Gorard's Sieve, Maryland Scientific Methods Scale, Cochrane Risk of Bias Tool, EPPI Weight of Evidence Tool, etc. State how this information will be used in the synthesis.

Data Synthesis

Data will be combined and summarised under the criteria of Popay et al. (2006) narrative synthesis
Describe criteria under which quantitative synthesis will be performed. If quantitative synthesis is appropriate, describe preferred summary measure (Cohen's D, Hedges' G, etc.) and how these will be combined. Describe any additional planned analyses (e.g. sub-group analysis). If quantitative synthesis is not appropriate, describe how data will be combined and summarised.

Meta-biases

N/A
Describe how meta-biases (publication bias, selective outcome reporting, etc.) will be addressed.

Appendix B. Search method of each database

Scopus	TITLE-ABS-KEY (code-switch* OR code-mix* OR code-alter* OR "code alter*" OR "code switch*" OR "code mix*" OR "language choice*" OR "spoken exchange*" OR "language alter*" OR "language switch*" OR "language mix*") AND TITLE-ABS-KEY (emotion* OR affect* OR mood* OR feel*) AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014))
Web of science	(TS= (code-switch* OR code-mix* OR code-alter* OR “code alter*” OR "code switch*" OR "code mix*" OR “language choice*” OR “spoken exchange*” OR “language alter*” OR “language switch*” OR “language mix*”)) AND (TS= (emotion* OR affect* OR mood* OR feel*))
ProQuest	summary (code-switch* OR code-mix* OR code-alter* OR "code alter*" OR "code switch*" OR "code mix*" OR "language choice*" OR "spoken exchange*" OR "language alter*" OR "language switch*" OR "language mix*") AND summary (emotion* OR affect* OR mood* OR feel*)
PsyINFO	limit keyword search ((code-switch* OR code-mix* OR code-alter* OR "code alter*" OR "code switch*" OR "code mix*" OR "language choice*" OR "spoken

	exchange*" OR "language alter*" OR "language switch*" OR "language mix*") AND (emotion* OR affect* OR mood* OR feel*)) to yr="2014 -Current"

Appendix C. Mixed Methods Appraisal Tool (MMAT) Version 2018 Templet and User Guide

MMAT Templet

Category of study designs	**Methodological quality criteria**	**Responses**			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	S1. Are there clear research questions?				
	S2. Do the collected data allow to address the research questions?				
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Is the qualitative approach appropriate to answer the research question?				
	1.2. Are the qualitative data collection methods adequate to address the research question?				
	1.3. Are the findings adequately derived from the data?				
	1.4. Is the interpretation of results sufficiently substantiated by data?				
	1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?				
2. Quantitative randomized controlled trials	2.1. Is randomization appropriately performed?				
	2.2. Are the groups comparable at baseline?				
	2.3. Are there complete outcome data?				
	2.4. Are outcome assessors blinded to the intervention provided?				
	2.5 Did the participants adhere to the assigned intervention?				
3. Quantitative non-randomized	3.1. Are the participants representative of the target population?				
	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?				
	3.3. Are there complete outcome data?				
	3.4. Are the confounders accounted for in the design and analysis?				
	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the research question?				
	4.2. Is the sample representative of the target population?				
	4.3. Are the measurements appropriate?				
	4.4. Is the risk of nonresponse bias low?				
	4.5. Is the statistical analysis appropriate to answer the research question?				
5. Mixed methods	5.1. Is there an adequate rationale for using a mixed methods design to address the research question?				
	5.2. Are the different components of the study effectively integrated to answer the research question?				
	5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?				
	5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?				
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?				

MMAT User Guide

1. Qualitative Studies

1.1. Is the qualitative approach appropriate to answer the research question?

Explanations The qualitative approach used in a study (see non-exhaustive list on the left side of this table) should be appropriate for the research question and problem. For example, the use of a grounded theory approach should address the development of a theory and ethnography should study human cultures and societies.

This criterion was considered important to add in the MMAT since there is only one category of criteria for qualitative studies (compared to three for quantitative studies).

1.2. Are the qualitative data collection methods adequate to address the research question?

Explanations This criterion is related to data collection method, including data sources (e.g., archives, documents), used to address the research question. To judge this criterion, consider whether the method of data collection (e.g., in depth interviews and/or group interviews, and/or observations) and the form of the data (e.g., tape recording, video material, diary, photo, and/or field notes) are adequate. Also, clear justifications are needed when data collection methods are modified during the study.

1.3. Are the findings adequately derived from the data?

Explanations This criterion is related to the data analysis used. Several data analysis methods have been developed and their use depends on the research question and qualitative approach. For example, open, axial and selective coding is often associated with grounded theory, and within- and cross-case analysis is often seen in case study.

1.4. Is the interpretation of results sufficiently substantiated by data?

Explanations The interpretation of results should be supported by the data collected. For example, the quotes provided to justify the themes should be adequate.

1.5. Is there coherence between qualitative data sources, collection, analysis and interpretation?

Explanations There should be clear links between data sources, collection, analysis and interpretation.

4. Quantitative Descriptive Studies

4.1. Is the sampling strategy relevant to address the research question?

Explanations Sampling strategy refers to the way the sample was selected. There are two main categories of sampling strategies: probability sampling (involve random selection) and non-probability sampling. Depending on the research question, probability sampling might be preferable. Nonprobability sampling does not provide equal chance of being selected. To judge this criterion, consider whether the source of sample is relevant to the target population; a clear justification of the sample frame used is provided; or the sampling procedure is adequate.

4.2. Is the sample representative of the target population?

Explanations There should be a match between respondents and the target population. Indicators of representativeness include: clear description of the target population and of the sample (such as respective sizes and inclusion and exclusion criteria), reasons why certain eligible individuals chose not to participate, and any attempts to achieve a sample of participants that represents the target population.

4.3. Are the measurements appropriate?

Explanations Indicators of appropriate measurements include: the variables are clearly defined and accurately measured, the measurements are justified and appropriate for answering the research question; the measurements reflect what they are supposed to measure; validated and reliability tested measures of the outcome of interest are used, variables are measured using 'gold standard', or questionnaires are pre-tested prior to data collection.

4.4. Is the risk of nonresponse bias low?

Explanations Nonresponse bias consists of "an error of nonobservation reflecting an unsuccessful attempt to obtain the desired information from an eligible unit." (Federal Committee on Statistical Methodology, 2001, p. 6). To judge this criterion, consider whether

the respondents and nonrespondents are different on the variable of interest. This information might not always be reported in a paper. Some indicators of low nonresponse bias can be considered such as a low nonresponse rate, reasons for nonresponse (e.g., noncontacts vs. refusals), and statistical compensation for nonresponse (e.g., imputation). The nonresponse bias is might not be pertinent for case series and case report. This criterion could be adapted. For instance, complete data on the cases might be important to consider in these designs.

4.5. Is the statistical analysis appropriate to answer the research question?

Explanations The statistical analyses used should be clearly stated and justified in order to judge if they are appropriate for the design and research question, and if any problems with data analysis limited the interpretation of the results.

5. **Mixed methods studies**

5.1. Is there an adequate rationale for using a mixed methods design to address the research question?

Explanations The reasons for conducting a mixed methods study should be clearly explained. Several reasons can be invoked such as to enhance or build upon qualitative findings with quantitative results 84 and vice versa; to provide a comprehensive and complete understanding of a phenomenon or to develop and test instruments (Bryman, 2006).

5.2. Are the different components of the study effectively integrated to answer the research question?

Explanations Integration is a core component of mixed methods research and is defined as the "explicit interrelating of the quantitative and qualitative component in a mixed methods study" (Plano Clark and Ivankova, 2015, p. 40). Look for information on how qualitative and quantitative phases, results, and data were integrated (Pluye et al., 2018). For instance, how data gathered by both research methods was brought together to form a complete picture (e.g., joint displays) and when integration occurred (e.g., during the data collection-analysis or/and during the interpretation of qualitative and quantitative results).

5.3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?

Explanations This criterion is related to meta-inference, which is defined as the overall interpretations derived from integrating qualitative and quantitative findings (Teddlie and Tashakkori, 2009). Metainference occurs during the interpretation of the findings from the integration of the qualitative and quantitative components, and shows the added value of conducting a mixed methods study rather than having two separate studies.

5.4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?

Explanations When integrating the findings from the qualitative and quantitative components, divergences and inconsistencies (also called conflicts, contradictions, discordances, discrepancies, and dissonances) can be found. It is not sufficient to only report the divergences; they need to be explained. Different strategies to address the divergences have been suggested such as reconciliation, initiation, bracketing and exclusion (Pluye et al., 2009b). Rate this criterion 'Yes' if there is no divergence.

5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?

Explanations The quality of the qualitative and quantitative components should be individually appraised to ensure that no important threats to trustworthiness are present. To appraise 5.5, use criteria for the qualitative component (1.1 to 1.5), and the appropriate criteria for the quantitative component (2.1 to 2.5, or 3.1 to 3.5, or 4.1 to 4.5). The quality of both components should be high for the mixed methods study to be considered of good quality. The premise is that the overall quality of a mixed methods study cannot exceed the quality of its weakest component. For example, if the quantitative component is rated high quality and the qualitative component is rated low quality, the overall rating for this criterion will be of low quality.

Appendix D. List of Selected Paper

Study	Reference
1. Vaschetto and Martos-Perry, 2016	Vaschetto, T. and Martos-Perry, N. (2016). Bilingual identity: Language switching aspects of the Spanish-English bilingual self (Doctoral dissertation, Wright Institute Graduate School of Psychology).
2. Nafa, 2018	Nafa, H.B. (2018). Code-switching as an evaluative strategy: identity construction among Arabic-English bilinguals in Manchester (Doctoral dissertation, Manchester Metropolitan University).
3. Trede, 2017	Trede, F. (2017). Clients' perspectives on bilingual therapy and language switching (Doctoral dissertation, William James College).
4. Su, 2018	Su, Q. (2018). A study of code-switching in Chinese web novels. *2018 International Conference on Asian Language Processing (IALP)*. https://doi.org/10.1109/ialp.2018.8629220
5. Sánchez and García, 2020a	Sánchez, María Jesús, & Pérez-García, E. (2020). Code-switching, Language Emotionality and identity in Junot Díaz's "Invierno." *Atlantis. Journal of the Spanish Association for Anglo-American Studies*, *42*(2), 99–118. https://doi.org/10.28914/atlantis-2020-42.2.05
6. Alhourani, 2018	Alhourani, A. Q. (2018). Code switching as a communicative strategy for the bilingual Saudi speakers at Jouf University. International Journal of Linguistics, Literature and Translation, 1(4), 63-72.
7. Hadour, 2022	Hadour, T. (2022). Topic analysis of French–English tweets in France. Digital Scholarship in the Humanities, 37(1), 121-136.

8. Carstens and Hoon, 2019	Carstens, S., & Ang, L. H. (2019). Conversational code switching. Asian Journal of Social Science, 47(4–5), 508–533. https://doi.org/10.1163/15685314-04704005
9. Tale and Alqahtani, 2020	Tale M. A., & Alqahtani, F. A. (2020). Code-switching versus target-language-only for English as a foreign language: Saudi students' perceptions. English Language Teaching, 13(9), 18. https://doi.org/10.5539/elt.v13n9p18
10. Chi, 2016	Chi, Y. F. Y. (2016). Multilingual couples' disagreement: Taiwanese partners and their foreign spouses (Doctoral dissertation, Birkbeck, University of London).
11. Rudra et al., 2016	Rudra, K., Rijhwani, S., Begum, R., Bali, K., Choudhury, M., & Ganguly, N. (2016). Understanding language preference for expression of opinion and sentiment: What do Hindi-english speakers do on Twitter? *Proceedings of the 2016 Conference on Empirical Methods in Natural Language Processing*. https://doi.org/10.18653/v1/d16-1121
12. Yarzebinski et al., 2015	Yarzebinski, E., Ogan, A., Rodrigo, Ma. M., & Matsuda, N. (2015). Understanding students' use of code-switching in a learning by teaching technology. *Lecture Notes in Computer Science*, 504–513. https://doi.org/10.1007/978-3-319-19773-9_50
13. Rolland et al., 2017	Rolland, L., Dewaele, J.-M., & Costa, B. (2017). Multilingualism and psychotherapy: Exploring multilingual clients' experiences of language practices in psychotherapy. *International Journal of Multilingualism*, *14*(1), 69–85. https://doi.org/10.1080/14790718.2017.1259009
14. Sánchez and García, 2020b	Sánchez, María Jesús, & Pérez-García, E. (2020). Relationship between code-switching and emotional identity in Junot Diaz's short stories. *Literatura y Lingüística*, (42), 91–117. https://doi.org/10.29344/0717621x.42.2587

15. Nawaz et al., 2023	Nawaz, N., Atta, A., & Naseem, N. (2023). The impact of code-switching in affective support and learners' success in Pakistani ESL classrooms at University Level. *Journal of Nusantara Studies (JONUS)*, *8*(1), 95–116. https://doi.org/10.24200/jonus.vol8iss1pp95-116
16. Hammoud, 2020	Hammoud, D. E. (2020). Towards an integrated approach: A sociolinguistic analysis of Monica Ali's *brick lane*. *Text & Talk*, *41*(1), 23–45. https://doi.org/10.1515/text-2019-0101
17. Erol, 2022	Erol, A. (2022). Student Code Switching in a Private High School in Turkey: A Case Study on Students' and Teachers' Beliefs (Doctoral dissertation, Bursa Uludag University (Turkey)).
18. Ng and Lee, 2019	Ng, L. L., & Lee, S. L. (2019). Translanguaging practices and identity construction of multilingual Malaysian University graduates in Digital Media. *English Teaching & Learning*, *43*(1), 105–123. https://doi.org/10.1007/s42321-019-00021-6
19. Ladegaard, 2018	Ladegaard, H. J. (2018). Codeswitching and emotional alignment: Talking about abuse in domestic migrant-worker returnee narratives. Language in Society, 47(5), 693–714. https://doi.org/10.1017/s0047404518000933