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Emotion Processing in a Highly Proficient Multilingual Sub-Saharan African Population: A Quantitative and Qualitative Investigation

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Abstract: Research using traditional experimental paradigms (e.g., Priming, Stroop and Simon tasks), narratives and interview type data have revealed that bilingual speakers process and express emotion differently in their two languages. In the current study, both a qualitative and quantitative approach were taken to investigate how individuals who know and regularly use several languages process emotion in each of their languages. In Experiment 1, emotional stimuli in the L2 and L3 was quantitatively investigated using an Affective Simon Task. Participants consisted of Sub-Saharan African multilinguals who had acquired Kiswahili (L2) after their mother tongue (L1), followed by English (L3). The results revealed no difference in the way emotion and emotion-laden words were processed in the two languages (Kiswahili and English). However, significant Affective Simon Effects emerged for positive emotion and emotion-laden words, suggesting that these multilinguals largely process positive emotions in their L2 and L3. In Experiment 2, narrative data generated by multilinguals was used to determine how language selection was influenced by context and type of emotional situation. Themes that emerged within the qualitative analysis revealed that one's L1 was the more emotional language when expressing negative emotions, while the L2 and L3 were reported to be used more frequently when expressing positive emotions, or when discussing more sensitive or embarrassing topics.

Keywords: Bilingualism; Multilingualism; emotion; emotional language

1. Introduction

Over the years, research using traditional cognitive paradigms (e.g., Priming, Stroop, and Simon tasks), narratives, and interview type data has revealed that bilingual speakers process and express emotion differently in their two languages (Altarriba and Basnight-Brown 2010; Dewaele 2008; Harris 2004; Marian and Kaushanskaya 2004; Pavlenko 2005). This finding has implications not only for issues surrounding processing and acquisition in a foreign language, but also for those working in clinical settings, where bilinguals will often switch into their second language if they want to distance themselves emotionally from an event, as the less dominant language has been described as the emotionally distant language in many cultures (Harris 2004; Santiago-Rivera and Altarriba 2002). Early research exploring the intersection of language selection and emotional expression, using open-ended responses, observed that many multilinguals report the emotional weight of the phrase 'I love you' to be strongest in their first language (L1) (Dewaele 2008). In addition, multilinguals also report feeling different when they switch into a second (L2) or third (L3) language, describing that often they feel less logical, less serious, or even less emotional (Dewaele and Nakano 2012). Meanwhile, early research aimed at exploring physiological markers of emotional processing used skin conductance responses (SCRs) to measure the level of arousal from various stimuli (often words and pictures). As one example, Harris

et al. (2003) reported that SCRs were particularly strong in the L1 for negative stimuli (e.g., cancer, kill, death), taboo items (e.g., curse words, sexual terms), and reprimands ('Don't do that'; 'Shame on you') (see also Harris 2004, for a review).

1.1. Valence Differences in Emotion Processing in Stroop and Affective Simon Tasks

Valence differences in language processing (i.e., differences between positive and negative stimuli) have been widely reported within the monolingual language processing literature. For example, studies using the Emotion Stroop paradigm often reveal that negative stimuli produce larger Stroop interference effects (i.e., indicating that negative emotional items interfere more with cognitive processing and are activated to a greater degree in early stages of processing) (McKenna and Sharma 1995). Similar findings have been reported with other paradigms, such as rapid serial visual presentation (RSVP) tasks, where it was found that repetition blindness effects were larger for emotional items, particularly that recall was improved for negative items. This was interpreted as occurring because those items capture attention more readily (Knickerbocker and Altarriba 2013).

Another paradigm that has been used to examine a level of emotion processing, at early stages of activation, is the Affective Simon Task (AST) (De Houwer and Eelen 1998). In this original work, participants were presented with nouns and adjectives that had either a positive, negative, or a neutral affective connotation (e.g., baby, murder, happy, cruel). Participants were instructed to respond to the grammatical aspect of the words, with half of the participants responding with 'positive' to nouns and 'negative' to adjectives, while the other half responded 'positive' to adjectives and 'negative' to nouns, irrespective of the valence of the word. The results suggested that even though the valence of the stimulus was not relevant and was to be ignored, participants responded faster to the words which had the same valence as the response.

In 2003, De Houwer adapted the AST, in terms of how participants were to respond. For example, participants were first presented with words in white ink and were instructed to press P on the keyboard for positive words (e.g., kind) and Q for negative words (e.g., hostile). Within the experiment, they were also presented with the same words appearing in blue or green ink colors. For these trials, participants were instructed to respond by pressing P on the keyboard for all words appearing in green, and to respond by pressing Q for all words that appeared in blue. Using this methodology, De Houwer observed that participants responded faster to positively valenced words that appeared in green (i.e., congruency effect). The results from this study demonstrated that key responses were facilitated or inhibited by the valence of the words. The responses given by the participants were based on color discrimination, and yet, valence seemed to play an important role in processing. Interestingly, and of relevance to the discussion on valence differences, the size of the effect was significantly greater for negative stimuli as compared to positive stimuli.

Not surprisingly, the use of these cognitive paradigms has been extended to the study of emotion processing in bilingual populations. The Emotion Stroop task, mentioned earlier, has been used to explore whether emotion words are processed differently in the L1 versus L2. Sutton et al. (2007) investigated Emotional Stroop effects in Spanish-English bilinguals. They examined response latencies to negative and neutral color words that appeared in both Spanish and English. Significant interference effects (i.e., slower response times to emotion words) were observed in both languages. Specifically, the size of the interference effects did not differ across languages, indicating that emotion words are capable of capturing attention in both of a bilinguals' languages (i.e., at least for early bilinguals who were highly proficient in both languages). In a second demonstration of emotional Stroop processes in bilinguals, emotion word processing was tested in Finnish-English bilinguals, who also exhibited high levels of proficiency in their two languages (Eilola et al. 2007). Eilola et al. (2007), like Sutton et al. (2007), observed significant interference effects in both L1 and L2.

Like the Stroop task, the AST has also been used to examined emotion processing in the L1 and L2. Altarriba and Basnight-Brown (2010) used the AST to explore positive and negative emotion word representation in English-speaking monolinguals and Spanish-

English bilinguals. In additional to the bilingual component, another novel aspect of this study was that emotional stimuli were separated based on whether they were emotion or emotion-laden. In the past, items of this nature have typically been combined in various experimental paradigms aimed as examining emotion processing, yet differences in how they are activated do appear to exist. Emotion words are typically those that characterize a particular emotional state (e.g., happy, sad, angry), while emotion-laden words often indirectly activate a positive or negative emotion (e.g., cancer, grave, gold). In both the monolingual and bilingual emotion processing literature, differences have been consistently reported between emotion and emotion-laden words for both behavioral and neurological data (Altarriba and Basnight-Brown 2010; Knickerbocker and Altarriba 2013; Zhang et al. 2017).

For this reason, Altarriba and Basnight-Brown (2010) sought to utilize the AST in a bilingual sample, while also making a distinction between emotion and emotion-laden items in their design. In Experiments 1 and 2, with monolingual participants, significant Affective Simon Effects were observed for positive and negative emotion-laden words (Experiment 1), as well as for negative emotion words (Experiment 2). Positive emotion words did not produce the congruency effects that are characteristic of the AST. According to Altarriba and Basnight-Brown (2010), a possible explanation for the difference in the two experiments could be that emotion-laden words are often objects or situations that are concrete and more imageable than emotion words. Thus, it is possible that the Affective Simon Effect obtained by previous studies (in which emotion and emotion-laden words were mixed) could be due to the greater influence and the presence of emotion-laden words in the stimuli lists. In addition, when the task was applied to the bilingual sample, significant Affective Simon Effects were observed for positive and negative emotion-laden words, in both Spanish and English (Experiment 3). For emotion words, significant effects emerged in English, for positive and negative items, but in Spanish, significant effects were produced for negative items only. In summary, this study revealed that the AST can be effectively used to examine emotion processing in bilinguals, while also demonstrating the importance of distinguishing between emotion and emotion-laden words in a paradigm that is different from that previously used to examine these discrepancies. In the current study, this same paradigm will be extended to the processing of emotion and emotion-laden stimuli in one's L2 and L3, in an effort to expand this original work by Altarriba and Basnight-Brown (2010) to that of a multilingual population.

1.2. Translation Differences in Multilingual Populations

In addition to processing differences that exist for emotional stimuli in the L1 and L2, bilingual language representation is often characterized by issues related to translation, or more specifically, how well an item translates across languages. It is well established, through both linguistic and psychological research, that words in one language do not always have a direct translation across languages. This linguistic challenge is often presented as one of the reasons why bilinguals code-switch, to better convey the full meaning of what they desire to express (Heredia and Altarriba 2001). When it comes to emotion processing, anecdotal evidence often suggests that emotion words are some of the most difficult to translate for those who know and use more than one language. As Pavlenko (2005) points out, much of this is likely due to the fact that languages differ in the size of their emotional lexicon. For example, she describes that the English language has an estimated 2000 emotion words, with Dutch estimated to contain roughly 1500, meanwhile, the Indonesian language only has a couple hundred words to describe emotion. This is important, as naturally it will affect how one's lexicon develops, the manner in which they express emotion, as well as the language they may choose to use when discussing an emotional event.

For many years, despite acknowledging that translation ambiguities exist, few studies using traditional cognitive paradigms systematically examined whether this variable was influencing outcomes and how it may be considered in models of bilingual memory. In 2002, Tokowicz, Kroll, de Groot, and van Hell (Tokowicz et al. 2002) conducted an analysis

of stimuli use in previously published bilingual studies and observed that roughly a quarter of items used in these well-known studies had multiple translations. Since then, translation ambiguity has been explored in various paradigms and been manipulated in studies focused on language acquisition (Basnight-Brown and Altarriba 2016; Bracken et al. 2016; Degani et al. 2016; Tokowicz and Kroll 2007; Tseng et al. 2014).

Despite bilinguals reporting specific challenges in translating emotional stimuli, quantitative evidence describing the extent of this phenomenon was limited. In order to empirically determine the degree of translation ambiguity for emotion words, Basnight-Brown and Altarriba (2014) examined the number of translations generated for concrete, abstract, and emotion words in two bilingual populations (Spanish-English and Chinese-English bilinguals). It was consistently observed, across both language directions (L1–L2 and L2–L1), that emotion words produced the largest number of translations across languages, for both bilingual groups. Interestingly, Chinese emotion words specifically elicited a very high number of translations, indicating that a direct translation for many emotions is even more challenging in that language. This was important, as it provided translation norms for words that describe a specific emotion, for both bilinguals that share an alphabetical script across their languages, as well as for those who do not.

1.3. Current Study

In recent years, the number of multilinguals has grown globally, due to changes in political, educational, and environmental situations. However, to date, there is a limited understanding in how multilinguals express and process emotion in their languages, given that most studies have focused on bilingual samples. The focus of the current study is to explore emotion processing in a multilingual population from Sub-Saharan Africa, an area known for its linguistic depth and cultural diversity. In addition, an even more limited understanding of the cognitive processes surrounding multilinguals in Africa exists, given that so few studies in this domain have been conducted on the continent. For example, a recent systematic review of papers published in top psychology journals discovered that less than 1% of first authors and participant samples come from Africa, despite the continent comprising almost 20% of the global population (Thalmayer et al. 2021). For that reason, it is our goal that the current study can begin to shed some light on the processing of language and emotion in this linguistically rich population, and that our understanding of language processes will be enhanced through the study of populations that are under-represented in the research landscape.

The focus of the current study was to examine how a highly proficient multilingual population processes emotion in their L2 and L3, using a sequential mixed methods approach (Quantitative → Qualitative). The quantitative portion (Experiment 1) examined the processing of emotion in the L2 and L3, using the Affective Simon task, analogous to the Altarriba and Basnight-Brown (2010) study. As mentioned, the East African region is characterized by tremendous linguistic diversity and depth. In Kenya specifically, many individuals refer to their ethnic language (referred to by many as the mother tongue) as their L1. Given that there are more than 40 ethnic groups represented in Kenya, many different mother tongues exist (e.g., Kikuyu, Kamba, and Luo are some of the most widely spoken for the sample in this study). In addition, Kiswahili serves as the National Language of the country, while English serves as the Official Language of the country. As a result, the average Kenyan knows and uses a minimum of three languages daily, with many knowing several more.

Therefore, the main aim of Experiment 1 was to determine whether multilingual individuals process emotions in their L2 and L3 differently, or whether all learned languages apart from the mother tongue have a similar representation. In addition, a secondary goal was to determine whether emotion and emotion-laden words are processed differently in the L2 and L3, given that they have been found to be different in both monolingual and bilingual populations. Since emotion words often do not translate directly across languages and may result in multiple translations, a norming study was piloted first, in order to

determine which Kiswahili translations were the best representation, for this specific population. For the quantitative measures, we chose to focus on L2 and L3 processing, primarily because this task involved a timed reading task. Prior experience with this population revealed that they are highly skilled readers in their L2 and L3, having conducted much of their education in those languages. The L1 varies tremendously across the population, due to the diversity in ethnic groups that exist within Kenya. Furthermore, self-reports from this multilingual population indicate that many do not read in their L1, as that is a language used primarily for spoken communication with family members. As a result, it was important to focus on those languages (L2 & L3) in which the participants read, given the nature of the experimental task. For the qualitative portion (Experiment 2), multilingual participants generated a written narrative essay, a reflection to a study they learned about in a group setting. This allowed them to freely discuss how they use each of their known languages to express emotion in various situations. Key themes from these responses were identified as dominant patterns in emotional selection for the multilinguals and are discussed in terms of how they supplement the quantitative findings from the Affective Simon Task.

2. Methods

2.1. Experiment 1 (Part A—Norming Study)

2.1.1. Participants

Fifty participants from the United States International University—Africa (USIU—Africa) completed the norming study. These students were from Kenya, Tanzania, and Rwanda, and all participation was voluntary. The study was approved by the USIU-Africa ethical review board.

All participants were multilingual and knew English and Kiswahili as two of their languages. The L1 (mother tongue) varied across participants, which is common in the East African region, given that there are dozens of mother tongue languages represented. Self-reported data from the Language History Questionnaire (LHQ, adapted from Marian et al. 2007) revealed that the average AoA of Kiswahili and English was 3.6 and 4.5 years old, respectively (see Table 1). Despite English and Kiswahili both being acquired at young ages (and in close succession), English skills were rated higher and English was reported to be used for a larger percentage during each day. This is likely because the participants were attending university at the time of investigation, and university instruction across Kenya is conducted in English. Therefore, verbal communication, as well as reading and writing in English, likely composed a large portion of their daily language behavior. The multilinguals also reported using "other" languages for a smaller percentage of the day, referring to the use of their mother tongue, and/or to a fourth language for some (often those are reported to be languages studied at university).

2.1.2. Stimuli

All participants were presented with a list of 20 emotion words and 20 emotion-laden words, in English, taken from Altarriba and Basnight-Brown (2010). For each category of emotion words, 10 were positively valenced and 10 were negatively valenced. All items were matched on word frequency and length, and all items were high in arousal, with positive and negative items being matched on this characteristic (according to Bradley and Lang 1999). As expected, valence significantly differed across the categories, with positive words being high in valence and negative words being low in valence (see Altarriba and Basnight-Brown 2010).

Table 1. Language History Questionnaire Data for Norming and Affective Simon task: Means and standard deviation (in parentheses).

	Norming	Affective Simon
Kiswahili (L2)		
Age of acquisition (years)		
Speaking	3.6 (2.2)	4.7 (2.8)
Reading	5.6 (2.4)	6.4 (2.7)
Self ratings of language skills		
Spoken comprehension	5.5 (1.4)	6.0 (1.0)
Speaking	5.2 (1.5)	5.6 (1.2)
Reading	5.2 (1.6)	5.7 (1.3)
Writing	4.9 (1.7)	5.3 (1.5)
English (L3)		
Age of acquisition (years)		
Speaking	4.5 (2.8)	6.3 (3.2)
Reading	5.3 (2.5)	6.8 (3.1)
Self rating of language skills		
Spoken comprehension	6.3 (0.97)	6.1 (0.9)
Speaking	6.0 (1.1)	5.8 (0.7)
Reading	6.3 (1.0)	6.2 (0.8)
Writing	6.1 (1.1)	5.9 (0.9)
Estimated daily language usage		
Kiswahili	34%	38%
English	54%	45%
Other	12%	17%

2.1.3. Procedure

Participants were provided with the list of English words in written format and were instructed to translate the words into Kiswahili without looking at a dictionary and without referring to anyone. They were told that they could leave a blank space for any words they were unable to translate. After they were done with the translation, they were asked to fill in the LHQ.

2.2. Experiment 1 (Part B—Affective Simon Task)

2.2.1. Participants

Forty-two students from USIU-Africa (36 females/6 males; mean age = 27.01), who did not participate in the norming task, completed the Affective Simon task (AST). For this task, one requirement was that the multilinguals had been exposed to Kiswahili (L2) before they were exposed to English (L3). LHQ data revealed that the participants had an average AoA of Kiswahili and English of 4.7 and 6.3 years old, respectively (see Table 1). All participants had a native language (L1) that was different from both Kiswahili and English. Native languages consisted of Arabic, Amharic, German, Kikamba, Kikuyu, Luhya, Luo, Munyo Yaya, Kimeru, Somali, and Pokot.

All participants had normal or normal-to-corrected vision and were tested for color blindness. Ishihara's (1939) test of color blindness was used to confirm whether the participants were able to distinguish between the colors used in the AST. All participants (except for 1), were able to correctly identify the plates on Ishihara's color blindness test. However, the participant who did not pass the test for all colors was able to accurately

distinguish between the blue and green colors of the Simon Task and was therefore still included.

2.2.2. Stimuli

As mentioned earlier, the English stimuli were originally derived from Altarriba and Basnight-Brown's study (2010), then normed in this study. All Kiswahili words were derived from the norming study in Experiment 1a. This resulted in a set of 16 emotion-laden words and 14 emotion words, for use in the AST (see Appendix A, Tables A1 and A2 for full list). For the English words, all items were matched on length, frequency, and rated high in arousal. Valence significantly differed across items, with positive words having higher valence than negative words (Bradley and Lang 1999). The average length of words in Kiswahili and English were matched for each condition (see Table 2).

Table 2. Attributes for the word stimuli used in the Affective Simon Task.

	EMOTION-LADEN WORDS		EMOTIONAL WORDS	
	Positive	**Negative**	**Positive**	**Negative**
English	*Friend*	*Death*	*Happy*	*Depressed*
Frequency	65.88	51.25	34.71	43.57
Arousal	5.50	5.91	5.75	6.15
Valence	7.34	2.49	7.61	2.63
Length	5.50	5.13	7.43	6.14
Kiswahili	*Rafiki*	*Kifo*	*Furaha*	*Huzuni*
Length	5.75	5.13	6.43	6.14

2.2.3. Procedure

Participants were first told to read and sign the consent. After making sure their phone devices were silent or switched off, Ishihara's (1939) color blindness test was given. The experiment started with written instructions on the screen. Participants were instructed to read carefully and then explain what they understood. If the participants misunderstood any of the instructions, they were corrected. All participants were reminded to be as accurate and as fast as possible when responding to the words.

The experiment was carried out on an HP W1972a desktop computer with an 18.5 inch LCD monitor. The computer software used was E-prime, version 2.0 (Schneider et al. 2002). All the words were displayed on the center of the screen on a black background. All words were presented in Courier New font with a font size of 18 and were in bold. Before the experimental trials, participants were given 20 practice trials. The first block (10 trials) had only white words, and the second practice block (10 trials) had blue and green words. Before each of the practice and test blocks, specific sets of instructions were given. For the white words, they were instructed to respond to the meaning of the word (e.g., positive/negative), and for the colored words, they were in-structed to respond to the color (e.g., blue/green). Participants responded by pressing 'P' and 'Q' keys with their index fingers. They pressed 'P' for positive white words and for blue words, and they pressed 'Q' for negative white words and for green words.

Each word appeared once, in random order, in three different colors; white, blue and green. The blue and green shades of colors were the same as that used by De Houwer (2003). Thus, every test block had 90 trials (30 emotional stimuli in each of the 3 colors). The same procedure was repeated for the second language, counterbalanced across participants, such that some participants received the Kiswahili block first and others received the English block first. The total number of test trials that each participant responded to was 180. All the words appeared on the center of the screen for 3000 ms, which was preceded by a fixation (+) that appeared on the screen for 500 ms. The inter-trial interval was for 1500 ms.

If the participant made an error, a red '+' sign appeared on the center of the screen. Once the participant completed the AST, they were asked to fill out the LHQ.

2.3. Experiment 2 (Qualitative Component)

In the qualitative portion of this mixed method study, narrative data from multilingual participants, who represented various Sub-Saharan African countries, was ex-amined in order to determine how the language selected in a given situation determined the level of emotional expression. Using this methodology, we sought to allow the multilinguals to freely discuss, through writing, how they select and use their languages in an emotional context.

2.3.1. Participants

Thirty-two participants from USIU-Africa participated in Experiment 2. They were from the same population as those who participated in Experiment 1. Like that sample, the L1 varied across participants, with Swahili and English, serving as their L2 and L3. The AoA for Swahili and English was 5.2 and 4.5 years old, respectively.

2.3.2. Procedure/Task

In a group setting, participants were exposed to the ideas presented by Chen et al. (2012, see review), which emphasize that how parents express emotion with their children, and the language in which they choose to do so, can affect emotional development and communication patterns. The participants were then asked, individually, to write a brief essay, reflecting on their own language experiences, particularly in terms of how and when they use their multiple languages. The session lasted approximately 50 min.

3. Results

3.1. Experiment 1 (Part A—Norming Study)

The translations given by the participants were evaluated and the translation that appeared most frequently was picked for use in the Affective Simon Task. Overall, 4 emotion-laden words (2 positive and 2 negative), and 6 emotion words (3 positive and 3 negative) were removed from the original stimuli list. This analysis revealed that some items had mixed valences (e.g., puppy was characterized as being "positive" in previous studies, but in Kiswahili, 'mbwa' was determined to have a "negative" connotation for many in the culture studied). In addition, due to the nature of Kiswahili having fewer emotion words as compared to English, several of the English words resulted in the same Kiswahili translation. In these cases, participants reported the items having the same meaning as another word in the document (e.g., anxious and nervous both translated into the same word in Kiswahili [wasiwasi]; frustration did not appear to have any direct translation in Kiswahili, producing 18 different translations in total). This was expected, and therefore, was one of the reasons why the norming study was important to pilot prior to conducting the Affective Simon Task. Since duplicate Swahili words could not be used in the Affective Simon Task, this resulted in a slightly smaller subset of stimuli for use in that task, as compared to that used in Altarriba and Basnight-Brown (2010).

3.2. Experiment 1 (Part B—Affective Simon Task)

Analyses of variance (ANOVAs) were conducted using a 2 (Language: Kiswahili and English) $\times$ 2 (Word Type: emotion and emotion-laden) $\times$ 2 (Valence: positive and negative) $\times$ 2 (Congruency: congruent and incongruent) model for all four variables. Data were trimmed for each participant such that any value that went above or below 2.5 standard deviations from the mean (for that individual participant) was replaced by 2.5 $\pm$ standard deviations from the mean. Overall, accuracy rates were very high, but a threshold was set where any participant with an accuracy rate below 70% was removed from the analyses (this applied to one participant only).

The results revealed a main effect for congruency, $F_{(1, 40)} = 18.68$, $p < 0.001$, showing that participants were significantly faster to respond to congruent trials as compared to incongruent trials. The analysis also showed a marginal main effect for word type, $F_{(1, 40)} = 2.95$, $p = 0.09$, indicating that participants were slower to respond to emotion words (851 ms) as compared to emotion-laden words (841 ms). Planned comparisons revealed that positive emotion and emotion-laden words, in English, produced significant Affective Simon Effects, $t_{(40)} = 5.31$, $p < 0.001$, and $t_{(40)} = 2.19$, $p < 0.05$. For the negative emotion words in English, there was no significant effect, $t_{(40)} = 1.54$, $p = 0.13$. Similar results were found for Kiswahili items, though the effect was more robust for positive emotion-laden words, $t_{(40)} = 3.97$, $p < 0.001$ (positive emotional words, $t_{(40)} = 1.65$, $p = 0.106$). None of the negative words showed a significant Affective Simon effect in Kiswahili (see Figures 1 and 2).

Figure 1. Mean Response times for emotion words. * Indicates $p < 0.05$, ˆ indicates $p = 0.10$.
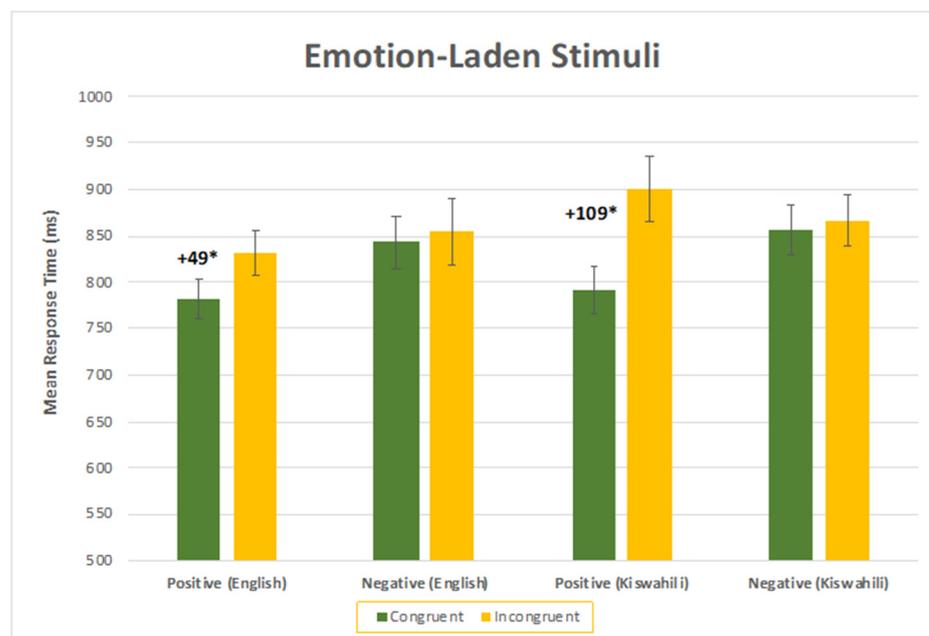
Figure 2. Mean response times for emotion-laden words. * Indicates $p < 0.05$.

In addition, the analysis further revealed a significant interaction between word type and valence, $F_{(1, 40)} = 4.72$, $p < 0.05$, as well as between congruency and valence, $F_{(1, 40)} = 9.99$, $p = 0.002$. The interaction between valence and congruency indicates that significant Affective Simon effects are largest for positively valenced emotional stimuli. The three-way interaction between language, word type, and congruency was also significant, $F_{(1, 40)} = 11.62$, $p = 0.003$, suggesting that while both types of positive emotional stimuli produced significant effects, the effects were not of the same magnitude across languages (larger effects for positive emotion words in English, but in Kiswahili, for positive emotion-laden items). Overall, the results from the quantitative portion of this study revealed significant effects only for positive emotion items, suggesting that stimuli which elicit a negative emotion are not as strongly encoded in one's L2 and L3, for this population at least. As discussed earlier, previously published work suggests that negative emotion words are often more strongly encoded in one's L1, as compared to their L2. It is possible that this is the case for these multilinguals as well, although we acknowledge that L1 Affective Simon processing was not examined due to the limitations mentioned, and the desire to focus on L2 and L3 processing. Despite that, the current findings do show that negative emotion is not captured as strongly in the L2 and L3, as compared to positive emotional items. As a result, the aim of Experiment 2 was to examine how multilinguals from this population observe and use emotional language in the L1, L2, and L3.

3.3. Experiment 2 (Qualitative Component)

The narrative responses were then anonymized, compiled, and analyzed manually using the six-stage process developed by Braun and Clarke (2006). Three main outcome themes emerged from the analysis.

3.3.1. Difficulty Finding a Direct Translation

Participants frequently described that it was often difficult to find a direct translation for an emotional expression in some of their languages, making it difficult for them to accurately express the emotion they wanted in that language. For example, one individual stated:

> "some words when translated don't carry the same weight as before, losing the whole essence of the word." (PN03)

This challenge was also expressed in the following ways:

> "It may be difficult to find words, which specify the actual feeling term which describes anger whereas in English there are different words for describing levels of anger ranging from irritation, annoyance, anger, rage to fury, therefore it is important to name the feelings correctly (e.g., 'I'm annoyed' is different from 'I'm angry'), however, we use one word to express all these different levels of anger." (PN06)

> "It feels like some words don't exist in Kiswahili, so I say them in Kikuyu because then the sentence I'm trying to construct will sound more meaningful, or the story I'm sharing will sound much funnier, sad . . . ." (PN28)

Meanwhile, others touched on cultural factors that may impact translation difficulties, primarily, when semantics are lost in translation due to differences in what is acceptable within a culture.

> "In my tribe it is not okay to talk about your emotions to just anybody and therefore there aren't many words to explain a certain emotion or feeling without sugar coating if it was negative and downplaying it if it was positive; the same goes for Swahili." (PN07)

> "Meaning may differ or even completely get lost in the translation. There is a lot of emphasis on the western traits with this approach. Some of the traits used to describe personality are relevant only to the western culture." (PN19)

3.3.2. L1 Was the Language Selected for Use When Expressing Negative Emotions

A second major theme that emerged, was that one's L1 was often the dominant language used to express negative emotions. Many participants reflected on situations and examples where their parents or themselves were prone to switch into their L1 when experiencing anger or grief. Statements detailing this type of language selection included:

"My mother always switches from English to Fulani when she is upset or when she is trying to threaten us because there are some Fulani words that when translated to English, do not sound as scary as they should be." (PN25)

"For my mother, when she wants to express her negative emotion, she will use her L1, which is Kikuyu. Emotions such as anger and frustration are very easy and acceptable to express and discuss in our culture. As for the "difficult" emotions such as affection and love, she will use her L2 languages, Swahili or English, to express them." (PN04)

[spoken by a participant describing when she learned about the death of a family member] "When I arrived at the hospital and got the tragic news, I switched from English to Kamba, to the amazement of my children, who though this being a somber time found it funny that I was speaking Kamba, something I rarely do . . . it felt more real and emotional to speak Kamba." (PN03)

"This is also the case with my parents who speak Kikuyu (which is their mother tongue), Kiswahili, and English fluently. Whenever they want to express their praise, appreciation and love for me they always use English . . . when expressing anger however, especially with my parents they stick to using Kikuyu because they feel that expressing it in English will not give it the same weight it would have in Kikuyu." (PN13)

3.3.3. L2 or L3 Was Used More Often When Expressing Positive Emotions or When Discussing More Sensitive or Embarrassing Topics

Finally, another important theme that emerged from the data emphasized that multilinguals from this population often prefer to use their L2 or L3 when expressing positive emotions or when discussing topics that one might consider to be embarrassing or uncomfortable. Many of the examples given, pertained to instances where a family member desired to express their love, but felt it would not be appropriate in their mother tongue language. Statements included:

"As a Kenyan who is a Kikuyu and I know both Kiswahili and English; when expressing affection to my mother by saying I love you, I don't say it in Kikuyu I say it in English my second language since its more expressive and meaningful." (PN14)

"As for the 'difficult' emotions, such as affection and love, she [my mother] will use Swahili (L2) and English (L3)" (PN08)

"I come from a strong African background where emphasis is placed on how one should behave and in society and what should be said in a particular situation. Expressions or emotion especially emotions of love are very rare especially from the parents to their children. However expressions of emotions like anger are very well expressed by the parents. Times however are changing and gone are the days where parents would never show affection or tell their children that they love them. The use of the English language has made all this possible, African parents can now express their love to their children by saying "I love you." (PN09)

"We mostly speak Kirundi at home, but it is very common for my mother to switch to French (L2) for endearing expressions such as "ma cherie" which can be translate to "my darling" or "sweetheart"; this is because our Burundian culture does not give a lot of room for such expressions" (PN16)

"I realise in my family, my mother has never told us that she loves us in Kikuyu. I have never heard any members of my extended family say it either. Any time she has told us that she does, it has been in English . . . my mother will use Kikuyu when she is expressing shock and anger a lot of the time. She would shout at us in Kikuyu when we were younger." (PN22)

Finally, in line with this theme, several participants also reported that discussing more taboo or embarrassing topics was easier to do when one was using their L2 or L3. This is illustrated below:

"I remember my mother discussing sex with me, in English (L3), yet I was proficient in Luo (L1). She would first start speaking in Luo (L1) and noted that it was embarrassing for her speaking about the topic and quickly switched to English (L3). This was also the case when we were discussing HIV and the use to condoms she would speak in English." (PN08)

Overall, these three themes emerged as the most robust within the qualitative analyses, providing some supplemental insight into how emotion is conceptualized and expressed in this multilingual population. One important thing to note, due to the open-ended nature of the generated responses, was that many of the multilinguals provided examples of emotional conversations and comments made by their parents. Therefore, some of the interactions are based on observations of how emotion was used in their community and familial systems, perhaps not attributed to the participant directly. This is insightful and suggests that future research on this topic could implement experimental designs and questions that tap into the participant's personal language use.

4. Discussion

The current work provides a novel contribution to the study of emotion, by ex-amining language usage in a population that is not just bilingual, but in those who know and use multiple languages on a daily basis. Furthermore, it explores the role of multi-lingualism and emotional expression in those on the African continent, an area that is often underrepresented in much of the psychological literature.

In summary, results from the quantitative data revealed significant effects for positive emotion items only, suggesting that stimuli which elicit a negative emotion are not as strongly encoded in one's L2 and L3, for this population at least. This supports previously published work that indicates that negative stimuli (e.g., negative emotion words, taboo words, reprimands) are more strongly encoded in one's L1. Although the L1 was not examined in this study, due to the lack of consistency in participants having a shared L1, the absence of these effects in L2 and L3 processing are indicative of stronger negative emotion representation in the L1 (especially when the qualitative data are considered). Specifically, results from the qualitative data revealed that the language selected for emotional expression was highly dependent upon the topic being discussed. For example, the majority of multilinguals reported using their L1 when expressing negative emotions (e.g., predominantly frustration or anger), but then switching to their L2 or L3 when discussing love or other positive emotions. This finding supports the Affective Simon Task results where significant effects were observed in the L2 and L3 for positive stimuli only.

As noted earlier, Dewaele (2008) originally reported that the phrase 'I love you' was perceived with more emotional weight (felt strongest in) the bilingual's L1 as compared to their L2. Interestingly, with this group of multilinguals, many reported (themselves or family members) choosing to express that level of emotion in the L2 or L3. This is likely influenced by cultural factors, and not solely driven by language per se, as many discussed that saying I love you in their mother tongue would not be as socially acceptable. In a similar vein, the data also revealed that some individuals reported switching to a less dominant language (often the L2 or L3) when discussing highly emotional or embarrassing topics, as a way of distancing themselves emotionally from the situation. For example, one participant noted this experience particularly well in reflecting on how their mother switched to her L3 when discussing the topic of sex. This supports some of the research

within the clinical domain, where it has been reported that bilinguals will switch to a less dominant language as way of emotionally distancing themselves from an event (Ladegaard 2018; Santiago-Rivera and Altarriba 2002). As noted earlier, the open-ended nature of the generated responses resulted in many multilinguals providing examples of emotional expression and interaction involving their parents. As a result, it is important to note that the L2 and L3 (often Swahili and English) are less dominant languages for the parents, according to the responses from the multilinguals. However, it is important to note that for the participants, Swahili and English were likely languages that were more dominant for them, due to being educated primarily in Swahili and English, as well as in attending an English-speaking university. This "dominance shift", often observed in many language users, is likely caused by the differing educational backgrounds between parents and children, differences in the use of the mother tongue across generations, and the age of the multilinguals.

Next, focusing on the quantitative data in more depth, allows us to examine two interesting questions (1) does the processing of emotion in the L2 and L3 differ for this multilingual population, and (2) is there a difference in emotion and emotion-laden processing across languages? For the first question, the results reveal that out of the 8 word categories (i.e., postive and negative emotion words in L3, positive and negative emotion words in L2, positive and negative emotion-laden words in L3, positive and negative emotion-laden words in L2), only 3 of them (positive emotion words in L3, positive emotion-laden words in L2 and L3) produced a significant Affective Simon Effect. This suggests that the processing and representation of emotion in the L3 is not identical to that in the L2. According to the results, there seems to be a pattern, in that, only positively valenced words appeared to produce the Affective Simon Effects in both L2 and L3. This finding could be attributed to proficiency differences across the L2 and L3. As Table 1 reveals, the multilinguals reported being more proficient in English (L3), as compared to Kiswahili (L2). These proficiency differences may be responsible for the larger effects observed for English emotion words. At the same time, the effects for positive emotion-laden words were larger in Kiswahili, a class of words characterized more often by nouns. The norming process conducted on emotion stimuli revealed that Kiswahili has fewer emotion words in the lexicon as compared to English, suggesting that emotion words are used more frequently in English and therefore, produced stronger effects. In turn, emotion-laden words had more consistency, due to being simple nouns, indicating that activation for those items could be heightened in Swahili if they are used more often than emotion items in that language.

In Altarriba and Basnight-Brown's (2010) study, the Spanish bilinguals produced the Affective Simon Effects in both positive and negative emotion words, as well as in positive and negative emotion-laden words in the L2. However, this study replicated the Altarriba and Basnight-Brown (2010) findings only for positively valenced items. However, when one takes the self-reported reflections of the qualitative responses into consideration, it becomes evident that due to linguistic and cultural factors, there is a strong tendency for positive emotions to be more robust in the L2 and L3, as compared to negative emotions, which were consistently reported to be elicited to a stronger degree in the L1. For the second question presented, significant Affective Simon Effects emerged for positive emotion-laden words in both languages, while for emotional words, the effect was only observed for positive emotion words in English. However, overall, the effects for emotional words were larger as compared to emotion-laden, suggesting that processing differences do exist. Overall, the findings from the current study reveal that English emotional stimuli are processed differently depending on whether they are presented in the L2 (in Altarriba and Basnight-Brown 2010) or in the L3 (current study). More importantly, the findings also suggest that positive emotions are processed strongly in both the L2 and L3, for a highly proficient multilingual population. This is consistent with studies that suggest that people prefer to express negative emotions in their first language. Thus, it is possible that the reason behind the null effects observed for negative emotion and emotion-laden words in

the L2 and L3 is because these emotions are largely processed in one's L1, which was not the focus of the Affective Simon Task in the current experiment.

Applied Research Domains

The importance of knowing which languages more richly code emotional language (L1, L2, L3, etc.) cannot be overemphasized. Published works have indicated that the strength and intensity of emotional language varies depending upon the context in which that language is acquired (Altarriba 2003, 2008). Native or first-learned languages often reserve the most richly deep and diverse emotional concepts and corresponding labels, quite possibly because that is the language in which emotional concepts were first tied to actual language labels, and, where physiological reactions were also associated with and derived from the use of those words (e.g., reprimands, taboo words, use of the word "no", etc.).

Knowing that L1 might capture the broadest range of emotional language in terms of valence and intensity, researchers have written about how the switching and mixing between languages might be used strategically in order to elicit fuller memories and reports of past experiences in situations such as those involving counseling and therapy, responding as eyewitnesses, or merely telling autobiographical stories in testimonials and other like situations (see, e.g., Marmolejo et al. 2009; Santiago-Rivera et al. 2009). For example, Santiago-Rivera and colleagues note that clients who were in therapy settings often switched from their native language into a second language when discussing particularly negative, distressing events in their lives. They aimed towards distancing themselves from those negative emotions, and instead, they preferred to use a second or even third language so that they could more easily discuss events without the distress caused by the use of negative langauges. Over time, those who are administering treatment can work through ways of having the client switch, when ready to do so, to work through those more emotional memories, when they deem the time is right, within a therapeutic session. By knowing that emotional language is often processed differently across languages in bilingual and multilingual speakers, strategies can be developed that can help to elicit information in a more appropriate manner. These kinds of switching techniques can be developed and formalized in any situation in which a bilingual or multilingual speaker is being asked to recount events from memory whether recent, or from the distant past.

5. Conclusions

From this study it could be concluded that the way Spanish bilinguals process their second language may be different from the way Kiswahili multilinguals process their second language. Additionally, it may be that Kenyans reserve their expression of negative emotions for their first language only, a language that was not investigated in the current study. This difference could be attributed to culture and lifestyle. Furthermore, the language people use can reflect the culture they came from since language and culture are so closely intertwined. Thus, when English was introduced to the Kenyan population during British colonialism, it did not just bring a language, it brought a culture. It brought a lifestyle where emotions may be expressed in a different way than the Kenyan cultures do. It can be suggested that the English language may have altered the way Kenyans express their emotions particularly when using language. It may have enhanced the use of positive emotional language.

In summary, the current study examined emotional processing and expression in East African multilinguals, with a goal of conducting exploratory research on a population that is not well represented in the emotion processing literature. Due to the exploratory nature of the design, there are several limitations that exist. As noted earlier, we were not able to examine L1 emotion processing in the quantitative portion of the study, due to the varied L1s that exist within an urban East African sample. Furthermore, as mentioned, a homogenous L1 Kenyan sample would not completely address this issue, given that many Kenyans from this age group report not reading in their mother tongue (preferring the L2

and L3 for reading, given that the education system within the country focuses on those languages). Despite those challenges, it is possible that future research endeavors focused on quantitative data could make use of experimental designs that do not rely as heavily on literacy skill of the mother tongue and/or which focus on a group of multilinguals who may be from a different age group and who read more regularly in their L1. Second, the qualitative design emphasized open-ended responses, allowing participants to freely discuss and generate responses based on their experiences and linguistic behaviors and observations surrounding emotional expression. In the future, qualitative data for this population could be obtained using direct questions, which are narrower in nature, allowing for more pointed responses (such as that implemented by Dewaele and colleagues). Finally, the current study examined emotion use and expression in a more familial context, yet outcomes may be different when contexts change (e.g., emotion selection when communicating with a friend, stranger, work colleague, etc.). This is another important domain for future study of emotional expression within multilingual communities. It is our goal that the exploratory findings of the current study can serve as a foundation and motivation for others interested in exploring emotion in less represented, yet linguistically rich, multilingual populations.

Appendix A

Table A1. Emotion words used in AST.

KISWAHILI	ENGLISH
Uoga	Fear
Hasira	Angry
Huzuni	Depressed
Wasiwasi	Anxious
Umia	Hurt
Upweke	Lonely
Kusumbuka	Troubled
Furaha	Happy
Mkweli	Honest
Tumaini	Hopeful
Tajiri	Wealthy
Mshindi	Triumphant
Nguvu	Powerful
Shukrani	Thankful

Table A2. Emotion-laden words used in AST.

KISWAHILI	ENGLISH
Kifo	Death
Kosa	Fault
Mafuriko	Flood
Mazishi	Funeral
Mwizi	Thief
Papa	Shark
Nyoka	Snake
Baka	Rape
Ndoto	Dream
Maua	Flower
Rafiki	Friend
Zawadi	Gift
Mbinguni	Heaven
Afya	Health
Tamani	Wish
Miujiza	Miracle

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