“Do you know what I mean? ”
An intercultural cross-generational study on emoji interpretation

by

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Abstract

The use of emojis is pervasive. Research has shown that 92% of the online population uses emojis on a daily basis, 95% of Internet users have sent an emoji at some point and a staggering number of more than 10 billion emojis are sent each day. However, emoji interpretations are not agreed collectively. This study aims to examine the interplay between emoji interpretation and the demographic factors of age and nationality. An online survey was distributed to both Chinese (N = 68) and Dutch (N = 61) participants from Generation Z and from those born as and before Baby Boomers, to gather their interpretation of a variety of selected emoji (N = 25), including faces, gestures, animals, fruits/vegetables, and objects which were expected to elicit different interpretations. Analysis of the responses demonstrated that nuanced emoji interpretations occurred across ages and nationalities. The results indicate that Chinese participants were more likely to use the selected emojis for unconventional meanings (i.e. meanings not related to those listed on the well-known reference site Emojipedia) and some of the unconventional interpretations among the Chinese resulted from homophony. This study contributes to our understanding not only of emoji-filled computer-mediated communication in cross-cultural and cross-generational contexts, but also reveals new ways of the homophonic pun use in Chinese Internet language: the present study is groundbreaking in discovering and describing the (apparently Chinese) phenomenon of "homophonic emoji interpretations."

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1. Introduction

CMC, short for computer-mediated communication, is the term referring to any communication which involves the use of two or more electronic devices. CMC breaks the barriers of time and location so that social interactions can take place at any time among people based in all corners of the world. The lack of emotional richness from CMC (especially text-based CMC), however, cannot be overlooked for the reason that non-verbal cues such as gestures, postures, facial expressions cannot be realized via text-based CMC, such as through WhatsApp, Facebook Messenger, or WeChat. Yet, thanks to the invention of emojis, a Japan-born pictographic system which functions not just as 'colourful small images' but more importantly as non-verbal cues in online textual communication, the downsides residing in CMC are to some extent counteracted.

Originally meaning 'pictograph', the word 'emoji' comes from Japanese "e" (picture) and "moji" (character). Emojis are represented by digital images, icons or pictographs to convey concepts not limited to facial expressions but also include animals, activities, food, drinks, gestures, and plants (Bai et al., 2019; Brody & Caldwell, 2017). Emojis have steadily been gaining more and more popularity in digital communication. According to Shaul (2015), 92% of the online population uses emojis on a daily basis. 95% of Internet users have sent an emoji at some point and over 10 billion emojis are sent each day (Bick et al., 2020). Emojis convey their meanings through graphic resemblance to facial expressions, gestures, objects, animals etcetera. Unlike words which have relatively stable dictionary definitions, emojis tend to be more open to interpretation, suggesting that nuances can occur when individuals interpret the same emoji rendering. Numerous studies have proven that age and culture have a role to play when it comes to nuanced emoji interpretations. For example, Weiß et al. (2020) found that an increase in age could be an indicator to a higher negative valence (basically saying that emoji are interpreted by older people as expressing less positive emotions), suggesting that age-related differences do exist in emojis. Furthermore, Yamamoto et al. (2020) identified an association between culture and emoticon (a pictorial representation of a facial expression by means of using characters, numbers and letters to visualize a persons' feeling, mood or reaction) evaluation.

Even though extensive efforts have been taken to examine intercultural emoji interpretations and also how age interacts with emoji understandings, a research gap still seems to exist in terms of investigating similarities or dissimilarities of emoji usage and interpretations between specific generations with diverging exposure to technology. Drawing inspirations from previous research, this study included culture (operationalized as nationality) and age as independent variables and aimed to tap into discrepancies of semantic emoji interpretations between Dutch and Chinese individuals aged from 16 to 27 (Generation Z) and 57 years old upward (Baby Boomers and older). Therefore, the research questions this study aims to answer are: 1)

Is there a relationship between emoji interpretation and nationality?; 2) Is there a relationship between emoji interpretation and age?

Since individual vendors such as IOS and Android create their own renderings for each emoji character, this gives rises to the consequence that the same emoji character can be viewed differently on e.g. iPhones by Apple than on other phones supported by e.g. the Android system. According to Statcounter (2022), Apple occupies 38.8% and 29.1% of the market share in the Netherlands and China respectively, making it the most purchased phone brand in both countries, so IOS built-in emojis were chosen for investigation in this study.

In the chapter that follows, relevant literature will be reviewed. It will start with a more extensive explanation of computer-mediated communication (CMC) and the absence of non-verbal cues in text-based CMC. After that, it will review research on how emojis and emoticons function in CMC and will discuss studies on how emoji interpretations may be influenced by age and culture.

2. Literature review

2.1 Computer-mediated communication

According to Norris (2012), computer-mediated communication or CMC is defined as human communication that occurs via the use of two or more electronic devices. Based on timing, CMC can be categorized into two forms - one being synchronous and the other being asynchronous. In the case of synchronous communication, communication takes place in real time, which means that all parties communicate simultaneously, even though they are not in the same location. On the other hand, asynchronous communication is where all parties do not communicate at the same time. In other words, the sender does not receive a reply from the receiver immediately after the message is sent out. Typical examples of synchronous communication include video conferencing, online voice calls, instant messages, while emails, text messages, discussion forum, blogs belong to the category of asynchronous communication. CMC can also be broken down into various types based on the medium or type of message. Communications can be carried out via video, audio or text. Text-based computer-mediated communication is a type of CMC where individuals communicate with each other via the written form. It can also be divided into synchronous form such as texting or chatting, and asynchronous form including emails, blogs and so on.

One of the benefits of CMC is that, due to the nature of CMC, individuals can engage in communications with others without constraint of time, location (Heras Ramírez, 2019b), so that social interactions among people based in different corners of the world has been largely strengthened by CMC. Additionally, CMC is also friendly to those who are intimidated by communications because of factors such as personality or disabilities. CMC allows them to engage in communication with minimal stress by means of allowing them to communicate in a location of their choosing. Especially after the WHO declared the outbreak of COVID-19 a global pandemic (Cucinotta and Vanelli, 2020), many counties have imposed national lockdowns for the sake of reducing the spread of the virus. To maintain social distance and to fulfill social needs at the same time, CMC provides new opportunities for individuals to keep in touch with friends and family members (Saltzman et al., 2020). In the meantime, massive numbers of employers have adopted the “work from home” practice, which means instead of commuting to their offices on a regular basis, they choose to communicate with colleagues via emails, video conferencing so as to finish the workload. According to Bick et al. (2020), after the outbreak of Covid-19, CMC is not 100% conducive, however, technological mediation can also impede the communication process in a way that communication of emotions can be extremely difficult while individuals are communicating via emails or any other forms of text-based communication. Therefore, based on the statement opined by Carassai et al. (2017), a lack of richness with regard to the communication of one’s emotions is the major downside that resides in text-based forms of communication. Multiple research

studies have been carried out, aiming to investigate the overarching negative aspects of CMC, in particular, the failure to convey emotions via non-verbal cues via text-based communication (Kiesler,1986; Siegel, Dubrovsky, Kielser, & McGuire, 1986; Sarbaugh-Thompson & Feldman, 1998; Kiesler, Siegel, & McGuire, 1984; Bos et al., 2008; Riordan, 2017). Therefore, the following section will mainly discuss the absence of non-verbal cues as potential communication barrier that occurs in CMC.

2.1.1 Absence of non-verbal cues in CMC

As mentioned above, non-verbal communication is a collection of non-verbal cues individuals adopt to get messages conveyed. To fully grasp the statements made concerning non-verbal cues, it is of importance to understand what is meant by non-verbal cues. Non-verbal cues include features that function outside of a language system, such as facial expressions, gestures, postures, gazing and so forth. Aptitudes, personality, gender and intentions can also be subsumed as non-verbal cues (Garrison et al., 2011; Kreuz & Riordan, 2010).

The lack of those non-verbal cues, which is the major difference between text-based CMC and face-to-face communication or FTF, can result in various negative consequences. Firstly, this can cause problems of receivers having difficulty interpreting the message (Sarbaugh-Thompson & Feldman, 1998; Kiesler, Siegel, & McGuire, 1984), which further leads to the consequence that messages are mis-interpreted and cohesive communication is lost between both parties. The absence of non-verbal cues also restricts the degree of information richness that is communicated between individuals . Media richness is defined by Daft, Lengel, and Trevino (1987) as “the ability of information to change understanding within a time interval” and multiple information cues such as tone of voice, body language and feedback can be realized by media richness. According to Warkentin, Sayeed, Hightower (1997), mutual understanding can be better achieved in communications that are rich in non-verbal cues than in non-verbal cue scarce interactions. Lastly, without non-verbal cues, interpersonal impression can be deterred (Siegel, Dubrovsky, Kielser, & McGuire, 1986), which echoes with the statement claimed by Kiesler (1986) that “without non-verbal tools, a sender cannot easily alter the mood of a message, communicate a sense of individuality, or exercise dominance or charisma. Communicators feel a greater sense of anonymity and detect less individuality in others.”.

Thus, it has been found that individuals prefer to communicate face to face rather than via the mediation of computer, when emotional information needs to be conveyed (Riordan, 2017). Given the fact that there is a lack of non-verbal cues in CMC, people assume that FTF communication is much more personal and effective than CMC when expressing or interpreting emotion is needed (Bos et al., 2008; Garrison et al., 2011; Riordan, 2017).

2.2 Emoticons and emoji

An emoticon (see **Table 1**) is a pictorial representation of a facial expression by means of using characters, numbers and letters to visualize a persons' feeling, mood or reaction. According to Dijsselbloem (2021), Scott Fahlman, a computer scientist of Carnegie Mellon University, was the person who coined the first ASCII emoticons, a standard set of codes representing typographical marks, in 1982, for the reason that he observed that tones were misconstrued and jokes were lost in conversations on electronic message board (Frick, 2018). Then Fahlman proposed colon-hyphen-right bracket :-) as a label for "attempted humour" and he sent the message, suggesting staff members to label their comments with a smiley face if they were being ironic or humorous, on Carnegie Mellon's bulletin board system (BBS) after an incident that a humorous warning about a mercury spill in an elevator was misunderstood as serious. After that, it has inspired a variety of other emoticons such as the "surprised" face :-o where the bracket is replaced by the letter "o", the "winking" face which uses a semicolon ;-) .

Emojis (see **Table 2**) are considered as the modern version of emoticons. Originally meaning pictograph, the word emoji comes from Japanese "e" (picture) and "moji" (character). The major difference between an emoticon and an emoji is the fact that emoticons are mainly comprised of ASCII symbols and punctuation marks, whereas emojis are represented by digital images, icons or pictographs. Besides, emojis extend from representations of facial expressions, they also are intended to convey concepts such as animals, festivals, food, drinks, gestures and plants (Bai et al., 2019; Brody & Caldwell, 2017).

The use of emojis is pervasive, and this has been proven by numerous researchers. According to Shaul (2015), 92% of the online population uses emojis on a daily basis. In the study conducted by Bick et al. (2020), 95% of Internet users have sent an emoji at some point and over 10 billion emojis were sent each day. Reasons why emojis are favored by individuals while communicating online lie in the fact that emojis are an important aspect of visual marketing. They are international, meaning that emojis can tear down language barriers and speak to the millennial generation and a sense of relatability can be better perceived via contents containing emojis (Bai et al., 2019; Chang et al., 2016; D'Addario & Walther, 2001; Gadzhibalaev, 2018; Gronning et al., 2014).

Table 1: List of emoticons and corresponding meanings (adapted from Wikipedia contributors, 2022b)

emoticon	**meaning**
:-)	happy face
:-D	laughing, big grin
:-))	very happy or double chin
:-(	frown, sad, angry

:-O	surprise, shock, yawn
:-*	kiss
:-P	tongue sticking out, cheeky/playful
:-/	skeptical, annoyed, undecided
:-X	sealed lips, wearing braces, tongue-tied

Table 2: List of emojis and corresponding meaning (adapted from Emojipedia)

emoji	**meaning**
	winking face
	face savoring food
	face with joy of tears
	eggplant
	grinning face with sweat
	unamused face
	smiling face with tear
	sleepy face
	skull

2.2.1 Roles and functions of emoticons and emojis in CMC

Research on the use of emoticons and emojis has addressed numerous issues, among which the function of emoticons as indicators of emotional state has received much attention (e.g. Rezabek & Cochenour, 1995). Relevant studies (cf. Kiesler, Siegel, & McGuire, 1984; Sproull & Kielser, 1986; Shao-Kang, 2008; Krohn, 2004) have assumed that the lack of non-verbal cues such as gestures, facial expressions, intonations in face-to-face communication can be compensated by emoticons. Put differently, emoticons used in CMC function in a similar way as non-verbal cues in face-to-face interactions.

Bos et al. (2008), Gronning et al. (2014), Huang et al. (2008) and Riordan (2017) have suggested using emoticons and emojis exerts a positive impact in communicating emotions to others on the grounds that a sense of warmth from face-to-face communication can be conveyed through emoticons and emojis. Likewise, according to Butterworth et al. (2018), an emotional context can be better created via the use of emojis, which potentially enhances comprehension and interpretation of a message by emphasizing the envisioned neutrality, positivity and negativity. According to Bos et

al. (2008), Gronning et al. (2014) and Hecht et al. (2017), emoticons and emojis have numerous functions. Firstly, tensions and negative tones can be mitigated via emoticons and emojis in text-based messages. And then, using emoticons and emojis is conducive to clarifying individuals' feelings. Similar results were also evident in the study conducted by Derks et al. (2008), opining that emoticons could replace nonverbal cues that occur in face-to-face communication in a way that emoticons can complement and enhance the verbal message. Scholars (Derks, Bos, & Grumbkow, 2008) who have sought to examine the effect of emoticons on how individuals interpret messages have found out that readers perceived messages with emoticons much more positive than those without. Another positive effect of the use of emoticons is the modification of flaming. Thompson and Foulger (1996) found out that unintentional outbreaks of flaming were less likely to be triggered by emoticon-containing messages that messages containing no emoticons.

However, according to Garrison et al. (2011), one controversy about emoticons and emojis is that, compared to non-verbal cues that occur in face-to-face communication, emoticons and emojis are considered as more voluntary and deliberate, resulting in the ambiguity when it comes to when emoticons and emojis are used, how they are interpreted and what the consequences are in diverse emotional contexts. Walther and D'Addario (2001) concluded that little influence of emoticons on message interpretation was found. Participants interpreted messages containing emoticons and messages without emoticons in a similar fashion and emoticons functioned neither to contradict the messages nor to strengthen them.

Dresner and Herring (2010) examined the function of emoticons from the pragmatic perspective. They based their research on Herring's archives which collected corpus from private e-mails, private chats, public chats and postings on public online discussion forums. The scholars argued that, instead of conveying emotion, the primary function of emoticons is to suggest an illocutionary force, which indicates the intended effect of the utterance. Besides, they also explained that emoticons also play the role as an indicator of "non-emotional meaning, mapped conventionally onto facial expression". A case in point is the wink emoticon ;-). According to Dresner and Herring (2010), the wink is not indicating emotion but signaling the intent of a joke.

Considering the fact that emoticons and emojis have become of great significance in everyday online communication in a sense of the roles they play in CMC, a more thorough exploration of emoticons and emojis is called for. Following the brief introduction of emoticons and emojis and the roles they play in CMC, the next section will zoom into how emoticons and emojis are interpreted across culture, age.

2.2.2 Different interpretations of emoticons and emojis

Two of the main steps in communication process are encoding and decoding (Cheney, 2011). Encoding is the process where message senders put information together. Information can be conveyed in linguistic forms and also non-verbal cues such as

facial expression, gestures can also be carriers of information. Decoding is where information is taken apart and assigned to meaning by receivers. Given the fact that people do not communicate exactly in the same way, miscommunication is inevitable. Factors such as culture and age can be contributing factors to diverging interpretations of certain messages. In the context of CMC, since emoticons and emojis function as non-verbal cues in face-to-face communication, it is also very likely that various interpretations might occur across individuals. The section that follows will discuss how interpretations of emotions and emojis vary across ages and cultures.

2.2.2.1 Age

People of various ages fall into five different generations, which are Traditionalists, Baby boomers, Generation Xers, Millennials and Generation Z (Lancaster & Stillman, 2002; Patel, 2017). Each generation demonstrates its own traits, values and life experiences, giving rise to the fact that individuals from each generation employ different language to communicate.

Traditionalists were born before 1946. They are characterized by their strict values. For example, they tend to seek job security and stability and they tend to work for the same employer throughout their whole life so that they demonstrate a strong sense of loyalty. In the meantime, the stereotype of this age group is that it is very hard for them to learn how to use modern technologies (Lancaster & Stillman, 2002), which is also in line with the study done by Krohn (2004), who suggests that emails to Traditionalists should not contain emoticons or emojis for the reason that most of them have trouble interpreting these symbols.

Those who were born between 1946 and 1964 are identified as Baby Boomers. Common traits shared among Baby Boomers are the overwhelming need to succeed, fierce competitiveness. Since they were born in the period when technology started to develop and to be introduced to their life, they remember the life before computers and are still finding it increasingly difficult to stand out at work due the fact that they are less computer literate compared to younger workers (Lancaster & Stillman, 2002). Scholars (Krohn, 2004; Myers & Sadaghiani, 2010) suggest that excluding emojis and emoticons from emails sent to Baby Boomers would be a wise choice on the basis that they might also find it difficult to interpret, understand and use emoticons and emojis.

The period between 1965 and 1981 is when Generation Xers were born. They are the generation who grew up in the era of computer technology, so they are considered as info-highway pioneers (Lancaster and Stillman, 2002). According to Myers and Sadaghiani (2010), compared to previous generations, Generation Xers are more comfortable with constant changes that take place in the computerized environment. when it comes to the use of emoticons and emojis, some of the commonly used emoticons and emojis can be added to emails sent to this group (Krohn, 2004).

The generation after Generation Xer is named as Generation Y or Millennials. Those

are a group of people who were born between 1980 and 1994. According to Lancaster and Stillman (2002), individuals born during this period of time are cyber literate so as they are known as "The Digital Generation" or media and technology savvy. Since most of them were born and raised in households with computers and mobile phones, literature (Krohn, 2004) indicates that Millennials would like to receive or send emails containing a generous amount of emoticons or emojis.

Following Generation Y or Millennials is Generation Z, referring to individuals born between 1995 and 2000 (Patel, 2017). There are some similarities shared between Millennials and Generation Z but there also exist dissimilarities. In terms of technology, Generation Z grew up in the era with the advent of WiFi and smartphone, making them true digital natives. another difference between, according to (Patel, 2017), is that Generation Z has a stronger sense and entrepreneurship and seek face-to-face communication more.

Apart from studies on attitudes of different generations towards emoji use, researchers have also dedicated efforts to investigating how age plays a role in how emojis are used and interpreted (Herring & Dainas, 2020; Hsiao & Hsieh, 2014; Waldman, 2016; Weiß et al., 2020). The research from Hsiao and Hsieh (2014), which examined age differences in recognition of emoticons, showed that, in comparison to their younger counterparts, older participants tended to evaluate perceived emoticons in a much more positive way and demonstrated less preference towards all emoticons than younger adults. Departing from the perspective of psychology, Weiß et al. (2020) selected 13 emojis for their study where 170 participants were recruited to evaluate how much the chosen emojis could represent different target emotions. The results revealed that an increase in age could be an indicator to a higher negative valence, suggesting that age-related differences did exist in emotion classification and even in highly artificial stimuli such as emojis. Herring and Dainas (2020) used 30 years old as the dividing line and investigated how participants who are under 30 and their over 30 counterparts used emoji differently. The researchers found that the younger group was very confident in understanding the intended meaning of the selected emojis, while those over 30 years old were more likely to report being "somewhat confident" and in some cases, "not at all confident". It also echoes with the finding from the study by Waldman (2016). It revealed the fact that emojis that are used by teenagers are less likely to be understood by adults over the age of 30 and people belonging to this age group also tend to use emojis less frequently. According to Waldman (2016), teenagers have devised "an intricate Hammurabi's Code of social media precepts to govern their interactions" of which adults are ignorant. Another finding from the study by Herring and Dainas (2020) is that older males were mostly likely and younger females were least likely to not to understand emoji functions and find emoji confusing and annoying. Zooming on specific emojis such as the blushing emoji, according to Choi (2016a, 2016b), it was interpreted as a romantic refusal by teens, whereas the interpretation changed a great deal in Waldman's study (2016), where adults aged in their 20-40s adopted the blushing emoji to express a sense of

(non-romantic) flattering, smug, satisfaction or simply just cuteness and friendliness.

The frequency and purpose of using emoji also change a great deal when it comes to different ages. Prada et al. (2018) found that, among the Portuguese survey respondents in the study, younger respondents, with more motivation for emoticon and emoji use, reported using emojis and emoticons much more frequently than their older counterparts. Similar findings can also be identified in another study (Webster, 2017), where 1,320 American adult internet users were interviewed and it revealed that Millennials were more likely to use emojis frequently than Baby Boomers or Gen Xer's did. As for the purpose of using emoji, a study (Gullberg, 2016) discovered an association between emoji adoption and being youthful. It explained that older people used many emojis in a message for the sake of feeling young.

In current research, a gap seems to exist in terms of investigating similarities or dissimilarities of emoji usage and interpretations between specific generations having diverging exposure to technology. This gap motivates the study to compare those born as or before Baby Boomers who started to have contact with technology and those true digital natives who were born after 1997 (Generation Z). The research hypothesis was developed as follows:

Hypothesis 1: It is hypothesized that there is a relationship between emoji interpretation and age.

2.2.2.2 Culture and nationality

Before an investigation of the interplay between culture and emoticon/emoji interpretations, it is of necessity to understand what is meant by culture. According to Straub et al. (2002), culture has always been a thorny concept and even a thornier construct. There are a host of scholars (Parsons & Shils, 1951; Kroeber, 1952) who defined culture on the basis of values. Another group of scholars (Ford, 1942; Schein, 1985; Moran & Stripp, 1991) also tried to define culture based on problem-solving. Hofstede (1980) devised a mechanism where culture value can be assigned to a particular group which is determined by geographical boundary. In a similar fashion, Gupta et al. (2002) proposed GLOBE as 10 priori clusters and these include South Asia, Anglo, Arab, Germanic Europe, Latin Europe, Eastern Europe, Confucian Asia, Latin America, Sub-Sahara Africa, and Nordic Europe.

Despite the fact that there exist some studies (Amalina & Azam, 2020; Talita, 2020) aiming to examine how race would influence individual emoticon/emoji use and interpretation, larger volumes of studies investigating how people use and interpret emoticons or emojis differently tend to adopt geographical boundaries, namely country of origin or nationality, to define cultural differences. In research by Lu et al. (2016), one of the research questions that the authors aimed to answer was "do the users from different countries have the same preference of using emojis?". The study discovered a diverging difference of emoji usage between different countries and such

difference was highly correlated to variance of cultural backgrounds, which is measured by the classical Hofstede culture index. Ljubešić and Fišer (2016) presented a world-wide spatial research which analyzed emoji-containing tweets. The results suggested that South-Eastern Asian countries and South American countries were the places where emojis were most popular on Twitter, while emoji usage frequency on Twitter was not as high in its birth country, Japan, and in the USA, where emojis flourished. Guntuku et al. (2019) also compared how emojis were used in terms of frequency, context and topic associations between the East (China and Japan) and the West (United States, United Kingdom and Canada). Difference regarding usage frequency was identified in the study, where Western users had higher likelihood to use more emojis than their Eastern counterparts. Interpretable distinctions were also found between emoji use, based on topical analysis in the study. For example, emojis that render rice-related dishes had highest projection on the LIWC category of "ingest" in Japan and China, while in Western countries such as USA, UK and Canada, meat and spaghetti had highest projection on this category.

Park et al. (2013) investigated the semantic, cultural, and social aspects of emoticon usage on Twitter and demonstrated that emoticons are not limited to conveying specific emotions or jokes, but further present sociocultural norms, the meanings of which can vary depending on the identity of the user. The study (Park et al., 2013) also revealed that vertical style emoticons such as ^_^ and T_T are more popular among users with an oriental culture, while horizontal emoticons like :) and :D (expressions based on the mouth shape) are more popular among western people. Formally, the vertical emoticons depict expressions based on the eye shape, while horizontal emoticons depict expressions based on the mouth shape. According to Yamamoto et al. (2020), Dutch participants put emphasis on the shape of mouth when evaluating emoticons, whereas for Japanese participants, eyes are the area where they would put weight on. This gives rise to the fact that the Japanese participants perceived sad eyes/neutral mouth emotion as sadder than their Dutch counterparts, whereas Dutch perceived a stronger sense of sadness from neutral eyes/sad mouth than Japanese.

Miller et al. (2016) stressed that even though emojis are frequently used, individuals do not necessarily agree on the meaning of a given emoji in communication. This is because multiple factors such as language, culture and regional characteristics play a role in individuals' preferences for specific emojis to convey their thoughts and emotions (Guntuku et al., 2019; Lu et al., 2016). In a study conducted by Koda (2004), Chinese and Japanese participants were asked how they interpreted and understood certain emoticons and emojis. The results of the study indicated that some emoticons and emojis selected in the experiment were interpreted entirely differently between Chinese and Japanese subjects. What was also observed in the study was that Chinese and Japanese tended to use the selected emoticons and emojis for dissimilar purposes (Koda, 2004).

On the basis of previous research, this study aims to follow the convention of adopting nationality (Chinese and Dutch) as an independent variable to operationalize culture and examines how individuals' nationality correlates with emoji interpretations. Thus, the research hypothesis was formulated as follows:

Hypothesis 2: It is hypothesized that there is a relationship between emoji interpretation and nationality.

2.2.3 Denotation and Connotation

According to the definition given by *Oxford Languages*, denotation refers to the literal meaning of a word. In contrast, connotation means an idea or feeling which people attach to a word together with its literal or primary meaning. Take the word "blue" for example. Denotatively speaking, the word "blue" refers to all blue things like sky, but it also connotes the mood of being down or sad.

According to Allan (2007), factors that affect the connotations of a language expression include not only people's encyclopaedic knowledge about its denotation. Other factors such as experiences, beliefs as well as prejudices about the context in which the expression is used are also involved in how people interpret an expression connotatively. Witherspoon (1980) interpreted connotation as such "Any language sign may be simultaneously of a denotative, connotative, or iconic kind of meanings. All these types of meanings are bound with cultural encodings or associations, for the meanings of words cannot be separated from their associations. Each language has its own metaphors that provide semantic cohesion within its boundaries. Motivated by the need and desire to influence others, people choose to use words which emphasize denotative meaning, connotative meaning or iconic meanings or all of them, during the same process its cultural meanings are created.".

Likewise, pictures can be interpreted in different ways by various persons. According to Pettersson (1997), as far as ambiguous pictures are concerned, there is always a major difference between a picture's denotation, the literal meaning, and its various connotations, the non-literal meanings. Highfield & Leaver (2016) observed that emojis often have other connotations apart from the straightforward representational meanings. A case in point is that the peach, eggplant and taco emojis cannot only depict their respective food, but also body parts such as buttocks, a penis and a vagina can be represented by these emojis. The similarity shared between languages and pictures is that pictures also contain abundant coded messages that are comprehensible in a given context and in a given age. Thus, to label participants' interpretations of fruit/vegetable/object/animal-rendering emoji in this study, the concept of denotation and connotation will be adopted. That is to say, representational interpretation of the emoji will be labeled as "literal", otherwise, "non-literal" will be tagged on connotative interpretations.

3. Research Methodology

3.1 Introduction

The aim that guided the study was to examine how age and nationality interacted with emoji interpretations. Building upon the aim, two research questions and corresponding hypotheses were formulated. A suitable research design was called for to answer the research questions posed. Thus, the research methodology used for this study is outlined in the ensuing chapter.

3.2 Research design

Survey was the form of data collection method used for this study. In the survey, participants needed to indicate their nationality, gender, and phone brand. Such data falls into the category of quantitative data due to the fact that individual demographic information took the numerical form. Participants also had to indicate what they believed was the meaning of several individual emojis: their interpretations of each individual emoji are categorized as qualitative data on the grounds that responses were text-based. In conclusion, this study adopted a blended approach where both qualitative and quantitative primary data were collected by surveys.

3.2.1 Data collection procedure

As mentioned above, a survey was adopted as the method to collect participants' responses. Surveys can take multiple forms, including face-to-face surveys, telephone and email mediated surveys as well as self-administrated surveys. For this study, participants were invited to complete the survey in a self-administrated way, meaning that the survey was explicitly designed to be completed by respondents without the assistance from an interviewer. Rather than a paper-and-pencil survey, an internet survey was chosen as the method to sample and gather data from respondents, who could access the survey via clicking on the anonymous survey link or scanning the survey QR code via their smartphones, computers or tablets.

Two sampling techniques were used in the study. Based on the context and the given nature of the study, the first technique adopted was convenience sampling. It is a sampling technique that was chosen by the researcher due to the fact that nationalities of participants were chosen based on the convenience and accessibility of the researcher. Numerous social media platforms such as Facebook, WeChat, WhatsApp and LinkedIn were used by the researcher and the research supervisor to obtain a suitable sample size. In the meantime, the researcher and the research supervisor also distributed survey links to friends, families and colleagues for participation.

Another sampling technique that was utilized in the study is snowball sampling, where existing subjects are asked to invite further subjects known to them, so the sample increases in size like a rolling snowball. This method was adopted for the

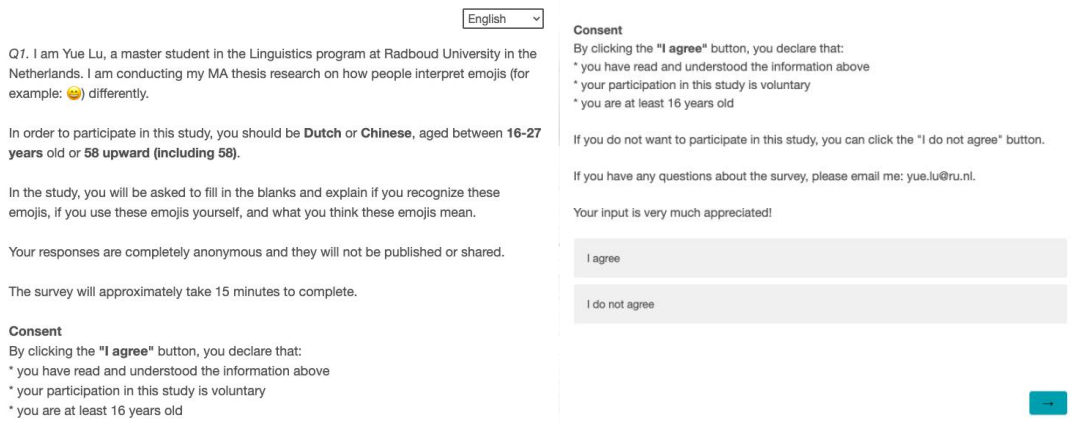
reason that the extensive use of social media in the survey distribution made it easier for existing participants to share the access to their friends, family and colleagues. Another reason to choose snowball sampling lies in the fact that, since the prerequisite of participating the survey were only nationality (Chinese and Dutch) and age (16-27 years old and 58 and above), inviting existing participants to nominate potential participants around them could be an efficient way to increase the sample size.

The platform where the survey was created is Qualtrics, which is a web-based software that allows users to create surveys and generate reports. The survey was designed initially in English. Taking into the account that elder Dutch and Chinese respondents might lack proficiency in English, with the help of the research supervisor, the researcher also translated the English version into Chinese and Dutch so as to elicit accurate responses. Overall, three sections are included in the survey and the elaboration of each section follows below.

3.2.2 Survey design

The first part of the survey **(see Figure 1)** provided the respondents with information about the purpose of the study, prerequisites for participating, time needed to complete the survey, and contact details of the researchers. Respondents were also informed that participation was anonymous, data collected would be well protected for confidentiality and participation withdrawal was also allowed. Respondents agreed to partake in the study by clicking the "I agree" button so that respondents declared that their age was over 16 years old, they had read and understood the information in the consensus form and their participation was voluntary. Respondents could terminate their participation by clicking the "I do not agree" button.

Figure 1 (informed consensus form of the survey)

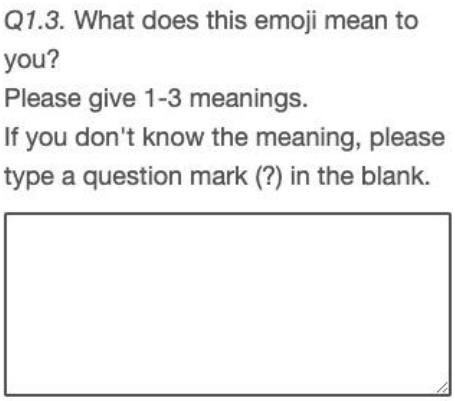


Section 2 primarily contains questions about age, nationality, and gender. In order to get a glimpse on their general familiarity with IOS built-in emojis, respondents were also asked about the phone brands that they were using.

The last section of the survey consisted of a predefined sample of IOS built-in emojis. Under each emoji rendering, three sub-questions were added. Two multiple choice questions under each rendering (**see Figure 2**) aimed to ask if respondents could recognize the rendering and how frequently they used them in their daily life. In order to elicit the semantic interpretation of each emoji rendering, following the multiple-choice questions, one open-entry question (**see Figure 3**) was added, where respondents were required to key in one to three meanings they had for each emoji rendering (**see Appendix for full survey**).

Figure 2 (two multiple-choice questions for each emoji rendering)

Figure 3 (one open-entry question for each emoji rendering)



3.2.3 Emoji selection

The sample of 25 emojis (see **Table 3**) to be investigated in the study are IOS built-in emojis and were selected on Emojipedia, a platform which documents meanings and common usage of emoji characters in the Unicode Standard. Some emojis from the

sample such as 😂 , 💀 were listed as most popular in April 2022. The rest of emojis were selected based on the researcher and the research supervisor's expertise, intuitions and past emoji research experience on emoji renderings that were most likely to trigger nuanced interpretations among individuals. To examine if there existed nuanced interpretations of the selected set of emojis, 10 participants of the target age groups but of various nationalities, including Chinese, Dutch, Norwegian, Venezuelan, were invited in the pilot test before the design of the questionnaire.

Table 3: Sample of 25 IOS built-in emojis

Name	IOS built-in emoji rendering
woman gesturing okay	🙆‍♀️
face with joy of tears	😂
call me hand	🤙
cherries	🍒
eggplant	🍆
face savoring food	😋
face with steam from nose	😤
folded hands	🙏
grimacing face	😬
grinning face with sweat	😅
ok hand	👌
peach	🍑
raising hands	🙌
skull	💀
sleepy face	😪
slightly smiling face	🙂

smiling face with open hands	
smirking face	
snake	
thumbs up	
unamused face	
winking face	
woman bowing	
woman facepalming	
woman tipping hand	

3.3 Data collection responses

Overall, the data collection procedure took approximately 4 weeks and it yielded a total number of 260 responses. Among all the responses, 51% of responses were excluded from the analysis due to the reasons that, first of all, some participants did not belong to the age groups that this study aimed to investigate; secondly, surveys that were partially completed were also eliminated from the analysis. That is to say, fully completed surveys from 129 participants of the target age groups (young age group: 16-27 years old; old age group: 58 years old and above) were saved for the final investigation. Chapter four will give a breakdown of the sample's demographic details.

Before distributing survey links via Qualtrics, a pilot test was conducted, to gather preliminary data from a small number of participants that are similar to the target group utilized in the actual study. For this study, 10 participants aged between 16 and 27 years old and 58 years old above (including 58) were recruited to take part in the pilot test to examine if the survey was designed appropriately enough so as to elicit desired responses. After the pilot test, responses were reviewed and feedback from the participants was collected for further amendments before distributing the definitive version of the survey.

3.4 Missing values

Missing values can be an inevitable occurrence and they can reduce the representativeness of the sample, distorting inferences about the population. In an attempt to lower the side effects caused by missing values to the largest extent, all

questions from the survey were made compulsory for participants to complete. For questions that participants could potentially find hard to answer, such as those regarding interpreting emoji renderings, an option of "key in a question mark in the blank" was provided for those who were not be able to recognize any meanings from the emoji rendering.

3.5 Data analysis procedures

As stated in the previous section, the objective of this study is to explore whether the same set of IOS built-in emojis are interpreted differently across ages and nationalities. Thus, the variables under examination in the study include age, nationality and emoji interpretations. To gather information on participants' nationality, multiple-choice items were designed where participants could choose the country they come from.

To obtain information about age, participants needed to key in their age in the blank. As mentioned earlier in Chapter two, those who were born between 1946 and 1964 are identified as Baby Boomers and Generation Z normally refers to individuals born between 1995 and 2000. Then age information was broken down into two groups, with one group being participants aged between 16 and 27 years old (Generation Z or young age group) and the other being those 58 years old and above (Baby Boomers or old age group). Responses from participants outside the target age ranges were excluded from the analysis.

To elicit semantic interpretations of emoji renderings, open-entry questions were asked where participants needed to provide one to three meanings for each rendering. An option of entering a question mark was also given for those struggling with attaching a meaning to the rendering. To analyse the semantics of the emojis, the data was first translated from Chinese and Dutch into English, after which, the complete interpretation list was split into two. One list was interpretations of facial and gesture emojis and the other listed interpretations of other emojis including those rendering fruits, vegetables, animals and objects. The reason of having two lists lies in the fact that labeling facial and gesture emojis into literal and non-literal interpretation was infeasible and even impossible. Thus, for later analysis, two labeling systems were adopted for the two lists of interpretations.

Emoji meanings offered on Emojipedia were adopted as conventional interpretations to label all the interpretations. For other emojis which render fruits, vegetables, objects and animals, literal and non-literal were utilized as the benchmarks for labeling. As mentioned previously, literal or denotative meaning refers to the most obvious or non-figurative meaning of a word, non-literal or connotative, however, means an idea or feeling which people attach to a word together with its literal or primary meaning. Take emoji  for example. Literally speaking, it simply refers to the object of a "skull". According to Emojipedia, however, the emoji  can also be

used to indicate figurative death, such as laughing to death or frustrated to death. Bases on meanings provided by participants, 7 labels were adopted for emojis rendering fruit/vegetable/object/animal (see **Table 4**).

For facial and gesture emojis, a different label, conventional and unconventional meaning, was applied. Conventional meaning is the most accepted meaning that emoji users attach to an rendering. According to Emojipedia, "woman bowing" emoji () , known as dogeza in Japanese culture, is used to express a sincere apology, or to request a large favor. Interpretations sharing similar meanings with "apology" and "asking for a large favor" were categorized into "conventional" meaning, whereas those deviated from the conventional meanings were labeled as "unconventional". 4 labels were used for facial and gesture emojis (see **Table 5**). The list of emoji meanings on Emojipedia is provided below (see **Table 6**).

Table 4: Label numbers and meanings for other emojis (fruit/vegetable/object/animal)

label number	label meaning
0	no interpretation
1	unconventional interpretation(s)
2	non-literal interpretation(s)
3	literal interpretation(s)
4	literal and non-literal interpretations
5	unconventional+ literal interpretations
6	unconventional+ non-literal interpretations
7	unconventional+ literal + non-literal interpretations

Table 5: Label numbers and meanings for facial and gesture emojis

label number	label meaning
0	no interpretation
1	unconventional interpretation(s)
2	conventional interpretation(s)
3	unconventional + conventional interpretations

Table 6: List of emoji meanings on Emojipedia

Emoji Rendering	Meaning on Emojipedia
	A person with arms above their head, making an 'OK' sign (circle) with the whole body.
	A yellow face with a big grin, uplifted eyebrows, and smiling eyes, each shedding a tear from laughing so hard. Widely used to show something is funny or pleasing.
	A hand with thumb and little (pinky) finger extended, making a traditional phone-like shape. May be used in conjunction with a face to

suggest “call me” (please).

It is commonly used as a shaka sign, which is a similar gesture at a different orientation.

Two rich red cherries with a green leaf and joined at their long stems.

May be used to refer to breasts on TikTok and other social media platforms.

A long, bulbous, bright purple eggplant, or aubergine in British English, shown with a leafy stem.

It is widely used to represent a penis.

A yellow face with smiling eyes and a broad, closed smile with its tongue sticking out of one corner, as if licking its lips in appetite or contentment.

It is widely used to convey that a food item is delicious. May also express that a person is attractive.

A yellow face with closed eyes, furrowed eyebrows, broad frown, and two puffs of steam blowing out of its nose, as if in a huff or fuming.

May convey various negative emotions, including irritation, anger, and contempt. May also convey feelings of pride, dominance, and empowerment.

Two hands placed firmly together, meaning please or thank you in Japanese culture.

A common alternative use for this emoji is for prayer, using the same gesture as praying hands. It can also represent a respectful greeting or show of adoration many in Southeast Asian religions and cultures, such as the Hindu namaste or Buddhist añjali mudra.

A yellow face with simple open eyes showing clenched teeth. May represent a range of negative or tense emotions, especially nervousness, embarrassment, or awkwardness (e.g., Eek!).

Intended to depict nerves or discomfort but commonly used to express a close call, as if saying Whew! and wiping sweat from the forehead.

A gesture showing the index finger and thumb touching to make an open circle. Represents “I’m okay” or “yes, that’s correct / good”.

The fleshy, pinkish-orange fruit of the fuzzy peach, shown with green leaves and sometimes a stem.

Thanks to its distinctive cleft, the emoji is most commonly used for “buttocks.” In certain contexts, the peach emoji may refer to impeachment.

Two hands raised in the air, celebrating success or another joyous event.

A whitish-gray, cartoon-styled human skull with large, black eye sockets. Commonly expresses figurative death, e.g., dying from extreme laughter, frustration, or affection.

A yellow face with closed eyes, mouth slightly open, and a blue snot bubble coming from its nose. Snot bubbles indicate a character is tired or sleeping in anime or may be used to convey sadness, dissatisfaction, or illness.

A yellow face with simple, open eyes and a thin, closed smile. Conveys a wide range of positive, happy, and friendly sentiments. Its tone can also be patronizing,

passive-aggressive, or ironic, as if saying This is fine when it's really not.

A yellow face smiling with open hands, as if giving a hug. May be used to offer thanks and support, show love and care, or express warm, positive feelings more generally.

Due to its hand gesture, often used to represent jazz hands, indicating such feelings as excitement, enthusiasm, or a sense of flourish or accomplishment.

A yellow face with a sly, smug, mischievous, or suggestive facial expression. It features a half-smile, raised eyebrows, and eyes looking to the side.

It is often used to convey flirtation or sexual innuendo.

A snake, a slithering reptile without limbs. Generally depicted as a yellowish-green snake facing left, with a long, coiled body and flicking a red, forked tongue.

May be used for various metaphorical senses of snake.

A thumbs-up gesture indicating approval.

A yellow face with slightly raised eyebrows, a frown, and eyes looking to the side. May convey a variety of negative emotions, including irritation, displeasure, grumpiness, and skepticism, as if giving the side-eye.

A yellow face with a slight smile or open mouth shown winking, usually its left eye. May signal a joke, flirtation, hidden meaning, or general positivity. Tone varies, including playful, affectionate, suggestive, or ironic.

A person bowing deeply which is known as dogeza in Japan. It is used to express a sincere apology, or to request a large favour.

A hand shown pressing against the head of a person, commonly written as facepalm. Used to display frustration or embarrassment at the ineptitude of a person or situation.

May be used in a similar context to the acronym SMH (shaking my head), or in relation to the Picard Facepalm meme.

A woman tipping her hand by her shoulder as if she's carrying a tray of drinks or flipping her hair.

This emoji is commonly used to express sassiness or sarcasm.

4. Results

4.1 Demographic variables profile

As mentioned earlier in Chapter three, the target age groups this study aims to examine are generations born before Baby Boomers (including Baby Boomers), namely those born before the year of 1963, and Generation Z (born after the year 1995). Thus, from the 129 responses (n=129) collected, all participants are within the targeted age ranges. 47.3% of participants are Baby Boomers or older (the old age group), leaving the rest (52.7%) Generation Z (the young age group) (see **Table 7**). Overall, the sample has an average age of 41.721 (SD = 21.416; Maximum = 91; Minimum = 16)

Table 7: The number of participants per group

	young age group	**old age group**	**total**
Chinese	38	30	68
Dutch	30	31	61
total	68	61	129

In terms of gender, 69.8% of participants identified themselves as female and 28.7% as male. 1.6% of participants preferred not to reveal their gender. As for nationality, 52.7% of participants reported themselves as Chinese and 47.3% as Dutch. With regards to the phone brands that participants were using, Apple topped on the list as the one owned by almost half of the population (48.1%), followed by Huawei and Samsung (both at 14%). Xiaomi/Redmi was the third most popular phone brand among the observations, the ownership of which accounted for 9.3%. Other phone brands accounted for the rest of the ownership. **Table 8** provides a summary of the demographic data of the respondents.

Table 8: Demographic Data of Respondents

Variable	**Level**	**Counts**	**Percentage**
phone brand	Apple	62	0.481
	Google	2	0.016
	Huawei	18	0.140
	OnePlus	2	0.016
	Oppo	6	0.047
	Samsung	18	0.140
	Vivo	2	0.016
	Xiaomi/Redmi	12	0.093
	other	7	0.054
age group	old	61	0.473
	young	68	0.527
gender	female	90	0.698

	male	37	0.287
	prefer not to say	2	0.016
nationality	China	68	0.527
	Netherlands	61	0.473

4.2 Analysis of emoji recognition and frequency of use

In this part of the analysis, emoji recognition and usage frequency of all selected emojis will be reported. Emojis under investigation in the study include 25 facial/gesture/fruit/animal/object emoji renderings (see **Table 1**). Generally speaking, the rendering that was recognized by nearly all participants (99.2%) was emoji (20) 👍. Other emoji renderings which were recognized by more than 90% of the participants included emoji (11) 👌, emoji (2) 😂, emoji (8) 🙏, and emoji (16) 🙂. Emoji that were considered as least recognizable was emoji (23) 💁‍♀️, reported as not recognizable by almost 70% of the participants. Emoji (25) 🤷‍♀️ was ranked as the second least recognizable emoji, followed by emoji (1) 🧕 and emoji (13) 🙌. Emoji (20) 👍 and emoji (2) 😂 were also ranked as the easiest renderings to recognize among both age groups and also among Dutch subjects. Chinese participants, however, reported that emoji (8) 🙏 and emoji (11) 👌 as the most recognizable emojis. Likewise, most participants from both age groups and nationality groups tended to find it difficult attaching an interpretation to emoji (23) 💁‍♀️.

Responses regarding usage frequency primarily clustered around "never" and "sometimes". "Never" tended to be most frequently chosen for half of the emojis, among which emoji (23) 💁‍♀️ was the one that had never been used by the highest percentage of the whole population (76.7%), followed by emoji (19) 🐍 (75.2%). Apart from that, emojis that were never used by more than half of the population were emoji (1) 🧕, emoji (3) 🤙, emoji (4) 🍒, emoji (5) 🍆, emoji (12) 🍑, emoji (13) 🙌, emoji (14) 💀 and emoji (25) 🤷‍♀️. It is manifest that participants were least likely to use fruit, vegetable, animal and object rendering emojis. Emojis that were "sometimes" used by highest percentage of participants were all gesture and facial expression related including emojis (6) 😊, emoji (8) 🙏,

emoji (9) 😬 , emoji (10) 😅 , emoji (11) 👌 , emoji (16) 🙂 , emoji (17) 🤗 , emoji (18) 😏 and emoji (22) 😉 . Emoji (2) 😂 was the only one where over 30% of the participants reported that they used it on a very frequent basis. Generally speaking, Dutch participants were more likely to use the selected emojis frequently, whereas, the likelihood of choosing "barely" and "sometimes" was higher for Chinese subjects when it comes to usage frequency. In terms of any frequency discrepancies between age groups, Generation Z tended to use the selected emojis more often than their counterparts, which was reflected from the statistics that subjects between 16 and 27 years old had a higher possibility of choosing "very often", "often" and "sometimes" than those over 57 years old.

4.3 Semantic analysis

What will be reported in this part aims to answer the two research questions proposed in the previous chapter. Two research questions included in the study are: 1) Is there a relationship between emoji interpretation and nationality?; 2) Is there a relationship between emoji interpretation and age?. As mentioned previously, two labeling systems (literal/non-literal; conventional/unconventional) were adopted to the emojis selected; therefore, facial expression/gesture emojis and other emojis rendering an object/fruit/animal/vegetable will be discussed separately as well.

4.3.1 Emoji interpretation and nationality

Investigation of relationships between emoji interpretation and nationality is the focus of this section. Chi-square test outputs are listed in **Table 9** to examine in which emojis an association between interpretation and nationality exists. Eyeballing the p-values on the list, those less than or equal to 5% indicate a relationship. Thus, the emojis that demonstrate an association between these two categorical variables are emojis 1/2/3/5/6/7/8/9/10/12/17/19/21/22/24, among which emojis 5/12/19 render a vegetable /a fruit/an animal and the rest are facial and gesture emojis. These emojis will be discussed separately below.

Table: 9 Chi-square test outputs
(association between emoji interpretation and nationality)

emoji	χ^2	df	p-value
1 🤕	6.059	2	.048*
2 😂	23.896	3	< .001***
3 👍	13.709	3	.003*
4 🍒	11.816	6	.066
5 🍆	40.800	6	< .001***
6 😋	21.490	3	< .001***
7 😤	19.082	3	< .001***
8 🙏	12.193	3	.007**

9 😬	17.769	3	< .001***
10 😅	20.387	3	< .001***
11 👌	0.928	3	.819
12 🍑	33.623	6	< .001***
13 🙌	4.495	3	.213
14 💀	13.675	7	.057
15 🤤	3.788	3	.285
16 🙂	2.816	2	.245
17 🤗	8.048	3	.045*
18 😏	6.563	3	.087
19 🐍	31.290	6	< .001***
20 👍	2.755	1	.097
21 😒	9.033	3	.029*
22 😉	37.465	3	< .001***
23 💁‍♀️	4.990	3	.173
24 🙆‍♀️	43.332	3	< .001***
25 💁‍♀️	3.671	3	.299

4.3.1.1 Emoji interpretation and nationality for animal/fruit/vegetable/object-rendering emojis

According to Emojipedia, emoji (5) 🍆, emoji (12) 🍑 and emoji (19) 🐍 literally are interpreted as "an eggplant", "a peach", and "a snake", respectively. Non-literally speaking, these emojis can also be used to indicate "a penis", "a booty" and figurative meanings connotated by a snake.

Statistical results suggested that a higher percentage of Chinese participants failed to recognize or unconventionally interpreted emoji (5) 🍆, emoji (12) 🍑 than their Dutch counterparts did. However, both Dutch and Chinese were very unlikely to attach unconventional meanings to emoji (19) 🐍, with the unconventional interpretation rate occupying only 1.55% of the whole population. Unconventional interpretation by Chinese participants was not caused by recognizing the renderings into other fruits or vegetables, rather, homophones played a role in this regard, meaning that Chinese participants tended to associate these emojis with other concepts sharing phonetic similarity with "peach". For example, "peach" was interpreted into "to escape", "an online shopping app", "naughty" and "to get lucky in love" by people from China, since "peach" in Chinese is "tao zi", which shares similar pronunciation with "tao li" (to escape), "tao bao" (the most popular online shopping app in China), "tao qi" (naughty), "tao hua yun" (to get lucky in love). The same phenomenon also occurred for emoji (5) 🍆 and emoji (19) 🐍. "Eggpant" in Chinese is pronounced as "qie zi" and the pronunciation of "qie" is similar to a Chinese modal article that people use to express a sense of contempt, resulting in the fact that emoji (5) 🍆 was interpreted as "contempt" by Chinese participants. "She", the Chinese pronunciation for "snake", is a homophone for "ejaculation" in Chinese,

which explains why the rendering of a snake was used by Chinese participants to refer to an act of ejaculating. Another interesting unconventional interpretation of emoji (5) 🍆 was "smile". The reason behind it is that, similar to say "cheese" while taking photos, Chinese photographers tend to use "qie zi" (eggplant) to prompt a smile from their subjects.

As for literal and non-literal interpretations, Dutch participants were much more likely than their Chinese counterparts to use emoji (5) 🍆 and emoji (12) 🍑 to express their non-literal meanings, "penis" and "booty", respectively. Among all participants who keyed in non-literal meaning for these two emoji rendering, 94% (emoji (5) 🍆) and 87.5% (emoji (12) 🍑) of them were participants from the Netherlands, whereas Dutch subjects were less likely to send these emojis as an indication of "eggplant" and "peach", compared to those from China. However, an opposite trend was observed for emoji (19) 🐍, which was interpreted into its connotative meanings by higher percentage of Chinese participants. No huge disparity was identified between these two nationality groups when it comes to literal interpretation.

4.3.1.2 Emoji interpretation and nationality for facial /gesture emojis

From the list of facial and gesture emojis where relationship was identified between interpretation and nationality, emoji (1) 🙆 was the only emoji which was not recognized by a higher percentage of Dutch participants. Despite the fact that more Dutch than expected tended to interpret this emoji with other meanings than its conventional meaning "okay", generally speaking, almost 97% of the whole population failed to interpret the conventional meaning "okay" or "approval" from the rendering. Unconventional meanings among Chinese participants varied from "love gesture" to "stretch", however, Dutch tended to use this emoji to depict "a roof over head", "I am home safely" or "a ballerina swing". Except for emoji (1) 🙆, Chinese participants had a higher likelihood of failure to provide a meaning to emojis such as emoji (2) 😂, emoji (3) 👍, emoji (6) 😊, emoji (10) 😅, emoji (17) 🤗, emoji (21) 😒, emoji (22) 😉 and emoji (24) 🤦. They were also more likely to indicate meanings that deviated from the interpretations provided on Emojipedia for the emojis mentioned above, plus emoji (7) 😤 and emoji (9) 😬.

According to Emojipedia, emoji (2) 😂 is used to show something that is funny or pleasing. Based on the data collected, all Dutch participants reported that they would utilize this emoji to convey the conventional meaning. More than 16% of Chinese participants, however, would send this emoji to express meanings other than "funny"

or “pleasing”. Some Chinese participants reported that emoji (2) 😂 rendered a crying face, while others would use this emoji to express “sadness”, “embarrassment”, “bitterness” or “excitement”. Only one Dutch participant reported in the survey that, apart from “laughing”, a sense of “sarcasm” could also be represented by this emoji.

Emoji (3) 🤙 literally indicates a “call me” gesture, but it also signals the shaka sign, a gesture used by residents of Hawaii to convey the “Aloha Spite”, a concept of friendship, solidarity, compassion and understanding (Wikipedia contributors, 2022c). The typical scenario where this gesture is utilized is where drivers use it on the road to communicate distant greetings and gratitude. Given the fact that there is a lack of semantic to literal translation of Shaka sign on Emojipedia, integrated with the interpretation provided on Wikipedia, conventional meanings that emoji (3) 🤙 depicts are “call me”, “greetings” and “gratitude”. Among the whole Chinese population taking part in the study, 30.8% of them couldn’t recognize the rendering, and 64.7% reported that they would use this emoji for other emotions rather than the conventional ones. The percentage of those who knew the conventional meanings of this emoji was low, only accounting for 4.4% of the Chinese population. Even though the ratio of not being able to recognize and unconventionally interpreting the rendering accounted for more than 70% of the whole Dutch participants, they were still more likely to use emoji (3) 🤙 as an indication of its conventional meanings. “Slick” and “smooth” were the most common messages that Chinese participants would use this emoji to convey. It is due to the fact that the gesture of a hand with thumb and little finger extended represents the number “6” in Chinese culture. The number “6” in Mandarin sounds like “slick” and “smooth”, and in Cantonese, it sounds like “good fortune” and “happiness”, therefore, number “6” is considered as a lucky or good number in Chinese culture.

With regard to emoji (6) 😊 , among all participants who provided interpretations that were not conventionally accepted from Emojipedia, 63.3% were participants from China. Based on the meanings from Emojipedia, emoji (6) 😊 is widely used to convey that a food item is delicious, and it may also express that a person is attractive, whereas, this emoji could also mean “cute” or “naughty” for some Chinese participants. Even though some Dutch participants also reported that emoji (6) 😊 could represent “cute”, the most commonly mentioned unconventional interpretations were “crazy”, “funny” and “joke”.

Emojipedia suggests that emoji (7) 😤 may convey various negative emotions,

including irritation, anger, and contempt and it also convey feelings of pride, dominance, and empowerment. Even though 73% of the whole population claimed that they would express the emotions mentioned above through this emoji, all conventional responses from Dutch side correlated with emotions such as irritation, anger; however, one Chinese participant reported that a sense of "contempt" could also be expressed through this emoji. In spite of the fact that Dutch participants were more able to recognize the rendering, when it comes to unconventional meanings, they also demonstrated a higher tendency, compared to Chinese participants.

More Chinese participants tended to be unable to recognize emoji (9)  , accounting for more than 83% of the nonrecognition . It also has the consequence that fewer Chinese participants tended to use this emoji for conventionally accepted moods such as nervousness, embarrassment and awkwardness or other types of unconventional emotions. Generally speaking, the ratio of conventional interpretation of emoji (9)  was low, namely, less than half of the population from each nationality group tended to use this emoji when they were nervous or embarrassed. But disparity was also observed between groups while eyeballing their responses. Some Chinese saw this emoji as a smiling face, while it was not the case at all for Dutch participants, who were more likely to associate this emoji with negative moods such as "annoyed" and they would use it when something went wrong.

Even though emoji (10)  is intended to depict nerves or discomfort, nowadays it is more conventionally used to express a close call, as if saying "Whew!" and wiping sweat from the forehead. The percentage of Chinese participants who uncovetionally interpreted the rendering was nearly double the ratio of their Dutch counterparts. Among all Chinese participants, more than 80% of them reported that emoji (10)  was intended to indicate other emotions rather than "a close call" and "feeling embarrassed" was the mostly commonly accepted meaning for this emoji among them. Even though fewer Dutch participants would get the interpretation deviating from the conventional ones, the percentage still accounted for more than 37% of the ones who unconventionally interpreted the emoji. "Oops" was the most commonly expressed emotion that Dutch participants used this emoji for.

Emoji (17)  conventionally indicates a hugging gesture. It is also used to represent jazz hands, indicating such feelings as excitement, enthusiasm, or a sense of flourish or accomplishment. The chi-square statistic suggested that the percentage of Dutch participants who keyed in meanings that were related to its conventional meanings was slightly higher than their Chinese counterparts' likelihood, which means that Chinese participants tended more to use it for other unconventional

meanings such as “polite and humble rejection” ,“to welcome someone” or “to greet someone”. Similarly, even though Dutch participants tended to send this emoji to say “hi” or “goodbye” as well, which was the most common unconventional meaning among Dutch people, they also used Emoji (17) 🤗 to express a sense of “cuteness”, “shyness” and even a request of a favor.

Emoji (21) 😒 or Unamuzed Face, as its name suggests, may convey a variety of negative emotions, including irritation, displeasure, grumpiness, and skepticism, as if giving the side-eye. Among all people who interpreted this rendering conventionally, nearly 70% of them were Dutch, who also showed less likelihood to attach other unconventional meanings this emoji than their Chinese counterparts did. Both Chinese and Dutch participants tended to unconventionally use the emoji to convey emotions such as “sadness” and “disappointment”, while there were also differences. For example, the frequently mentioned emotions that Chinese participants reported they would use this emoji for were “speechlessness” and “contempt”, while Dutch participants reported that they would use this emoji to express that they were bored.

According to Emojipedia, emoji (22) 😉 is a yellow face with a slight smile or open mouth shown winking. People may use it to signal a joke, flirtation, hidden meaning, or general positivity. Of all Dutch participants, more than 80% would attach conventional meanings to this emoji, whereas more than half of them simply literally interpreted emoji (22) 😉 as a “wink”. Some Dutch participants also added the scenarios where they would use this emoji, among which a typical scenario was when they intended to indicate that “something is not that serious” or “just kidding”. The ratio of Chinese participants attaching conventional or unconventional meaning to emoji (22) 😉 was similar, accounting for 35% (unconventional meaning) and 32% (conventional meaning) of all population from the group with China as their nationality, respectively. Chinese participants were more likely to interpret this emoji into a flirty wink than Dutch participants did. In addition, the most common unconventional emotion that Chinese participants used this emoji to depict was “cuteness”.

Emoji (24) 🤦‍♀️ or Facepalm is conventionally used to display frustration or embarrassment at the ineptitude of a person or situation. Among participants who interpreted the rendering as its conventional meanings, the percentage of Dutch participants was almost 5 times larger than the percentage of the Chinese participants. Results also suggested that 60% of the whole Dutch population in this study intended to send this emoji to show that they were embarrassed or frustrated, while the

percentage for Chinese participants was around 11.7%. 55% of the whole Chinese population would use this emoji to indicate other unconventional emotions, most commonly emotion of which was “speechlessness”.

Above is the analysis of emojis where the percentage of Dutch participants who got the conventional meanings correct outnumbered the ratio of Chinese participants. Emoji (8) 🙏 , however, was the only emoji where an opposite trend was observed.

According to Emojipedia, emoji (8) 🙏 renders two hands placed firmly together, meaning “please” or “thank you” in Japanese culture. A common alternative use for this emoji is for prayer, using the same gesture as praying hands. It can also represent a respectful greeting or show of adoration in some Southeast Asian religions and cultures, such as the Hindu namaste or Buddhist añjali mudra. Thus, conventional emotions this emoji intends to convey include “please”, “thank you”, “pray”, “greeting” and “adoration”. The data suggest that more Chinese tended to be able to recognize this emoji, and they also demonstrated higher likelihood to use this emoji to express emotions consistent with those from Emojipedia. The tendency to use this emoji to refer to unconventional meanings was higher for Dutch participants, among which more than 20% of them thought this emoji rendered a gesture of “high-five”.

4.3.2 Emoji interpretation and age

This section is devoted to analyzing emojis where associations between interpretation and age were observed. Chi-square test outputs are listed in **Table 10** to examine where associations existed. Thus, emojis that demonstrate an association between these two categorical variables are emojis 3/4/5/6/7/8/9/12/13/14/18/19/21/22/23/24 , among which emojis 4/5/12/14/19 render an object/a fruit/an animal and the rest are facial and gesture emojis. These emojis will be discussed separately below.

Table: 10 Chi-square test outputs
(association between emoji interpretation and age)

emoji	χ^2	df	p-value
1 🤩	3.713	2	.156
2 😂	4.944	3	.176
3 👍	14.756	3	.002**
4 🍒	29.715	6	< .001***
5 🍆	22.791	6	< .001***
6 🙂	8.779	3	.032*
7 😤	9.280	3	.026*
8 🙏	11.910	3	.008**
9 😬	14.189	3	.003**
10 😅	6.510	3	.089
11 👌	2.764	3	.429

12 🍑	34.410	6	< .001***
13 🙌	18.866	3	< .001***
14 💀	20.805	7	.004**
15 🤤	2.141	3	.544
16 🙂	1.033	2	.596
17 🤗	6.318	3	.097
18 😏	30.847	3	< .001***
19 🐍	25.406	6	< .001***
20 👍	0.240	1	.624
21 😒	16.486	3	< .001***
22 😉	12.156	3	.007**
23 👰	21.117	3	< .001***
24 👱‍♀️	9.808	3	.020*
25 🤷‍♀️	1.131	3	.770

4.3.2.1 Emoji interpretation and age for animal/fruit/vegetable/object-rendering emojis

Based on the statistical results, participants who were 58 years old and above tended to be unable to recognize emoji 4/5/12/14/19, compared to young participants, whereas emoji (19) 🐍 was the only emoji which was unconventionally interpreted by the same ratio (50%) of participants from the two age groups. For other emojis, the likelihood of attaching unconventional interpretations to those renderings among the aged was higher than that of their young counterparts.

Meanings that Emojipedia attaches to emoji (4) 🍒 are "cherries" and "breasts". It is manifest that nearly 60% of the old generation failed to recognize and interpreted the rendering into other , while the ratio among Generation Z was around 16%. Among those who were Baby Boomers and older, only three participants (all Dutch) reported that they would use this emoji to indicate "balls", "buttocks" and "flirt". Chinese aged participants were more likely to non-literally decipher emoji (4) 🍒 into "cute", "energetic" or "loving". No participant from the old age group was able to tell the non-literal meaning "breasts" from the rendering; 13.2% of the young generation, however, tended to use this emoji to signify "breasts".

Nonrecognition and unconventional interpretation of emoji (5) 🍆 were relatively low, occupying 19.3% and 11.6% of the whole population, respectively. "Smile" and "say cheese" were the common unconventional interpretation among the aged Chinese for the reason that eggplant's Chinese equivalent is "qie zi", which is the instruction that Chinese photographers would use to prompt a smile from subjects for a shoot. One Dutch from the old age group reports that this emoji could also be used to indicate "asshole". Participants from the young generation tended to mis-recognize

the rendering into fruit or courgette/zucchini. With regards to literal and non-literal interpretations of emoji (5) 🍆, participants who were 58 and above were more likely to interpret this rendering as an "eggplant" than expected, however, for those from Generation Z, this rendering was prone to be non-literally indicative of a "penis".

Emoji (12) 🍑 is a peach, shown with green leaves and sometimes a stem. According to Emojipedia, thanks to its distinctive cleft in the middle, people most commonly use this emoji to indicate "buttocks" and in some context, the peach emoji can also refer to "impeachment". Fewer subjects from the old age group tended to use this rendering to refer to its non-literal meaning "buttocks", which, however, was not the case for their younger counterparts, who were less likely to use this emoji to refer to a "peach". More young participants tended to use this emoji for its both literal and non-literal meanings. Young participants also showed a higher tendency to unconventionally interpreted this emoji into "taobao" (a Chinese shopping app), "naughty" (taoqi in Chinese), due to the fact that "taobao" and "taoqi" both include the sound "tao" which is identical with the Chinese pronunciation of "peach" (taozi).

Emoji (14) 💀 depicts a whitish-gray, cartoon-styled human skull with large, black eye sockets. It is also commonly used to express figurative death, e.g., dying from extreme laughter, frustration, or affection. The analysis suggested that almost 30% of the participants who interpreted the rendering solely as a "skull" or "skeleton" were 58 years old and above, and none from this age group was able to interpret its non-literal meaning. Some aged participants mentioned that this emoji represented literal death, which, however, was not this rendering's non-literal meaning (figurative death). Among all young participants, over 16% of them reported that they would use emoji (14) 💀 to indicate figurative death, such as dying from laughing too hard.

Emoji (19) 🐍 is the rendering of a snake. Emojipedia claims that it can also be used for various metaphorical senses of snake, even though it does not list its specific metaphorical senses. Thus, common non-literal meanings that a snake conveys such as "toxic", "dangerous", "traitor", and "sneaky" were included as benchmarks for interpretation labeling. The results showed that half of the unconventionally interpreted responses were from Generation Z and half from the old age group. More subjects aged between 16-27 tended to interpret this rendering literally, while subjects who were 58 years old and above had a stronger preference to indicate its non-literal meaning from the rendering, with Dutch being more likely to use this emoji to describe someone who was sneaky, deceitful, and Chinese having more likelihood to depict a dangerous situation through emoji (19) 🐍.

4.3.2.2 Emoji interpretation and age for facial /gesture emojis

Emojis 7/13/18/21/22/23/24 were the ones where the trend of higher possibility of non-recognition among the aged was observed. Conventionally, emoji (7)  can be use when someone feels irritated, angry, contemptuous, and it may also convey a sense of pride, dominance and empowerment. Older people, accounting for more than 76%, were less likely to recognize the meaning of the emoji, and they also tended to misinterpret the rendering, compared to participants from the young age group. When it comes to interpreting the conventional meaning of the rendering, no big difference was identified between the two age groups. The majority of the people from each age group tended to use this emoji to express feelings listed on Emojipedia.

Emoji (13)  , as described earlier, is a hand gesture for success or other joyous events celebration. 65% of those who reported not being able to tell the meaning from the rendering were 58 years old and above. Responses from their young counterparts showed much more variation, meaning Generation Z was more likely to interpret both conventional and unconventional meanings from emoji (13)  . Both young and old generations claimed that emoji (13)  could be used to express "stop" and "approval". However, only the younger generation would use this emoji when they intended to convey a "high-five" or "gratitude", and "wave goodbye" was the response that only occurred among the older generation.

Emoji (18)  is a smirking face, through which a sense of flirtation, slyness, smugness, or mischievousness can be conveyed. A higher percentage of older people was unable to interpret or tended to misinterpret the rendering, compared to their counterparts from the young age group. Nearly 80% of the interpretations that were related to its conventional meanings were contributed to Generation Z. More than half of the old generation would use this emoji when they were having negative feelings such as "sad", "contemptuous", "confused" "regretful" "unlucky" and so on.

Emoji (21)  renders an unamused face, which is used when people feel irritated, grumpy, unhappy and skeptical. Almost one third of the old generation failed to provide a meaning to this emoji, while the percentage for the young generation was comparatively lower, accounting for 10.2% of those born between 1997 and 2005. Even though both groups had similar likelihood to use this emoji to express emotions outside the choices provided on Emojipedia, the possibility to convey conventional meanings among the young was more than 3 times higher than that among the aged.

Emoji (22) 😉 represents a winking face, which can be indicative of a joke, flirtation, or hidden meanings. Other emotions such as playfulness, affection and irony can also be expressed by this smiley face. It is manifest that non-recognition was majorly contributed by old participants, who, nevertheless, also demonstrated a higher possibility to use this winking face to suggest emotions listed on Emojipedia. The tendency of interpreting emoji (22) 😉 in an unconventional way was higher among the young, compared with their aged counterparts. For example, Chinese Generation Z tended to send this emoji when they wanted the receivers to read the "cuteness" from the message. In addition, both the Dutch and Chinese young generations reported that emoji (22) 😉 also suggested a sense of "approval".

What is rendered by emoji (23) 🙇‍♀️ is a person bowing deeply, a posture called Dogeza in Japan, where people would use this posture to show a sincere apology, or to request a large favour. This emoji was the most unrecognizable one, with almost 60% of the whole population failing to provide a meaning to the rendering. All conventional interpretations were from those aged between 16-27, and none of the aged group was capable of decoding the conventional meanings of this emoji. Both Chinese and Dutch participants from the old age group reported that emoji (23) 🙇‍♀️ symbolized "studying". But Chinese subjects aged 58 and above tended more to send this emoji when they were in the state of "thinking very hard", which was suggested by one Dutch aged participant. However, Dutch Baby Boomers and older were more likely to use this emoji to express feelings of "confusion" or "despair".

Emoji (24) 🤦‍♀️ is a gesture of a facepalm, used to display frustration or embarrassment at the ineptitude of someone or a situation. More than half of the population either failed to recognize or misinterpret the rendering. Despite the fact that many more aged participants tended to have struggles with recognizing the rendering, accounting for more than 70% of non-recognition, they also demonstrated a higher likelihood to use this emoji to express the conventional meanings. Generation Z, however, were more likely to send this emoji in scenarios where they felt "speechless", "shocked" or "tired".

An opposite recognition pattern was identified in emojis 3, 8 and 9, which were less likely to be recognized by young participants. Emoji (3) 🤙 displays a traditional phone-like shape, normally conveying the "call me" message. A shaka sign can also be formed by extending the thumb and the pinkie. Not surprisingly, older participants

were more likely to misinterpret the meaning this emoji conveyed. Young participants accounted for more than 88% of the number of subjects who could interpret the conventional meaning out of this emoji. Only participants from Generation Z could identify that the gesture was associated with Hawaii culture, while those born before 1965 tended to use this emoji to convey a message of "approval".

Emoji (8) 🙏 depicts the gesture where two hands are firmly put together. This is the gesture used for "thank you" or "please" in Japanese culture, while it can also be used to indicate "pray". In other regions such as India or South East Asia, placing two hands firmly also displays a respectful greeting or adoration. Out of the whole population, almost 80% were able to use this emoji correctly. The young generation tended to unconventionally interpret the rendering more, compared to those aged 58 years old and above. They were more likely to attach unconventional meaning to this rendering. Through eyeballing their responses, "high-five" was a frequently occurring interpretation among the young, especially among the young age group from the Netherlands, but it was not the case for senior participants.

Emoji (9) 😬 is the depiction of a range of negative emotions such as nervousness, embarrassment and awkwardness. It is one of the two emojis which was recognized by a lower percentage of Generation Z. In comparison with their young counterparts, subjects from the old age group were more likely to interpret the rendering in an unconventional manner, occupying more than 75% of the whole population aged 58 and upward. A similar trend, however, was not found for the conventional interpretations, of which more than 78% were contributed by the young group, leaving a small amount by senior participants. Disparity regarding unconventional interpretations was also identified between the age groups. For example, the likelihood of using emoji (9) 😬 to indicate a positive mood was higher for young participants, around 13% of whom used the emoji to indicate a "smile" or an exciting or a cheerful state.

Emoji (6) 😋 was the only emoji where no disparity in non-recognition and conventional interpretations were found between young and old age groups. In terms of unconventional meanings, 33.8% of Generation Z reported that emoji (6) 😋 could be used to express emotions not limited to its conventional meanings such as "delicious" or "attractive", while the ratio of the old age group was slightly lower, around 26.2%. Both age groups claimed that "naughtiness" and "cuteness" could be described by emoji (6) 😋 , but more Generation Z'ers, especially young subjects from the Netherlands, tended to associate the rendering with "funny" and "crazy".

5. Discussion and conclusions

5.1 Summary of research findings

The study examined how culture (here, nationality) and age (here, generations) correlate with emoji interpretations. Research questions and corresponding hypotheses will be reiterated below:

Research questions:
1) Is there a relationship between emoji interpretation and nationality?;
2) Is there a relationship between emoji interpretation and age?

Hypotheses:
1) It is hypothesized that there is a relationship between emoji interpretation and age.
2) It is hypothesized that there is a relationship between emoji interpretation and nationality.

The data suggested that correlations do exist between nationality/age and emoji interpretation. The ensuing section will briefly discuss the findings in the data.

5.1.1 Nationality

Based on previous research exploring the effect that culture may exert on emoji/emoticon use and interpretation, it was confirmed that dissimilarities did occur among individuals from various cultural backgrounds or countries (Ljubešić & Fišer, 2016; Guntuku et al., 2019). In terms of usage frequency, the present study found that Dutch participants were more likely to use the selected emojis frequently, which is consistent with the findings in the study carried out by Guntuku et al. (2019), who found that Western users (Americans, British and Canadians) tended to use more emojis than their Eastern counterparts (Chinese and Japanese).

A relationship was also observed between nationality and emoji semantic interpretations for both facial expression/gesture emojis and emojis rendering fruits/vegetables/objects/animals. Chinese emoji users had a higher likelihood of failure to provide a meaning to most facial expression/gesture-rendering emojis selected for the study and they were also more likely to use those emojis to indicate meanings that deviated from the conventional interpretations provided on Emojipedia. As for fruit/vegetable-rendering emojis, Dutch participants were much more likely to interpret the sexual euphemism out of emoji (5) 🍆 and emoji (12) 🍑, while it was more possible for their Chinese counterparts to use emoji (5) 🍆 and emoji (12) 🍑 for its literal meanings, eggplant and peach, respectively. However, an opposite trend was observed for emoji (19) 🐍. Such findings of the study consolidated with findings from previous research (Miller et al., 2016; Guntuku et al.,

2019; Lu et al., 2016; Koda, 2004) that emoji interpretations are not agreed upon collectively and such nuanced interpretations are the result of multiple factors such as culture, language, and regional characteristics.

5.1.2 Age

As outlined in the literature review, multiple studies (e.g. Herring & Dainas, 2020) have proven that age does play a role in terms of predicting frequency of emoji/emoticon use. Webster (2017) even specified that Millennials were more likely to use emojis frequently than Baby Boomers or Gen Xer's. An association between age and emoji use was also observed in the present study. It revealed that in terms of frequency discrepancy between age groups, Generation Z tended to use those emojis more often than Baby Boomers and older, which is closely in line with the findings by Webster (2017).

A relationship was also observed between age and emoji semantic interpretations for both facial expression/gesture emojis and emojis rendering fruits/vegetables/objects/animals. The data suggested that, compared to Generation Z, participants from the old age group tended to fail to recognize all emojis rendering fruits/vegetables/objects/animals and the likelihood of attaching unconventional interpretations that are not listed on Emojipedia to most of the emojis in this category was also higher among the senior. For all facial expression and gesture-rendering emojis where an association between age and emoji interpretation was observed, participants aged 58 and older were more likely to fail to interpret any meanings or to convey meanings that were not related to the conventional ones listed on Emojipedia for more than half of the emoji renderings. The findings observed in this study are consistent with findings from previous research that younger people are more confident in understanding the intended meaning of emojis than those over 30 years old (Herring & Dainas, 2020).

5.2 Discussion of research findings

As mentioned in the results chapter, unconventional interpretations of emojis (especially those displaying renderings of fruits, vegetables, gestures, or animals) by Chinese subjects were mostly caused by homophones. Homophony refers to the phenomenon where words share an identical or very similar pronunciation. According to Wen et al. (2022), Chinese characters are often used homophonically in text-based CMC, to replace the original text so as to achieve more impressive and vivid expressions. In the present study, we saw that the trend among young Chinese internet users to use homophony can be extended from characters to emoji: in fact, several instances of homophonic emoji interpretations were identified here. For example, "naughty" ("tao qi" in Chinese), "escape" ("tao pao" in Chinese) and "get lucky in love" ("tao hua yun" in Chinese) can all be expressed by a "peach" ("tao zi") emoji. Surprisingly, the emoji of a "snake" ("she" in Chinese) can indicate the action of "ejaculating" ("she jing" in Chinese). Likewise, the emoji of a hand with thumb and

little finger extended (i.e. the "call me" emoji) can be used to mean "slick" or "smooth", because in Chinese culture that gesture represents the number six ("liu" in Chinese), which in Mandarin Chinese sounds like the words for "slick" and "smooth" ("liu" in Chinese). Those kind of unconventional emoji interpretations never occurred in the Dutch group. To put it another way, Chinese people sometimes have unconventional interpretations of emoji depending on the *pronunciation* of what is actually shown in the image, whereas Dutch people only have different interpretations depending on the *visuals* of the image. These creative, homophonic interpretations of emoji turned out to be mostly used by the Chinese participants of the *younger* age group.

Chu and Ruthrof (2016) identified homophone phrase substitution (HPS) as the phenomenon when Chinese speakers use inoffensive characters which share similar or identical pronunciation with sensitive or offensive phrasings to express criticism. This phenomenon can even be traced back to ancient imperial times in China. Xu Jun, a witty scholar, wrote a poem which contains two sentences "清风不识字，何故乱翻书"(qing feng bu shi zi, he gu luan fan shu?), which literally means that "Breeze, since you cannot read, why do you mess with my book by turning the pages?". The first character in the sentence "清" (qing), literally meaning "breeze", is identical to "Qing" in Qing Dynasty. Thus, the poem also can be interpreted as an oblique accusation towards the Qing authority of being illiterate. What is worth discussing is how the relationship is built up between the semantics of the characters and the semantics of the sound sequence. According to Ruthrof (2015), "aboutness" and its modification by "voice" are the fundamental ingredients for a natural language to operate. When reading a grammatically sensible sentence which does not make sense in a given linguistic context (put differently, a grammatically well-formed sentence with "odd aboutness"), native Chinese speakers may hesitate and look for homophonic guidance to understand what the sentence intends to convey. In a sensitive scenario, native speakers would be attuned that odd phrasing may convey meanings that are semantically irrelevant but homophonically relevant to what it says. Apparently, this phenomenon has continued into modern-day online communication, including emoji.

Another interesting finding is that there was only a single emoji that had higher relative frequencies of 'correct' conventional interpretations among Chinese participants than among Dutch participants. Specifically, emoji (8) 🙏 was the only rendering which was conventionally interpreted as "please", "thank you", "praying", "greeting" and "adoration" by more Chinese participants, whereas for all other emojis, responses from Dutch subjects were more 'correct', when compared with meanings listed on Emojipedia. This may suggest that Emojipedia is much more biased towards interpretations based on Western users. It may not be truly culturally inclusive when it comes to listing and documenting commonly accepted meanings used by individuals from various cultural backgrounds. According to the data, 20% of Dutch participants (mostly young Dutch participants) believed that emoji (8) 🙏 rendered a gesture of

"high-five", however, what is written on Emojipedia is that it is "*rarely* used as a high-five, despite often being suggested as one by emoji keyboard search features". This makes one wonder: what is this claim based on? Is it based on cross-cultural and cross-generational analysis of CMC data?

The present study also suggests that Emojipedia may not be up-to-date with semantic changes in emoji among young people, because the young generation tended to use emoji (22) 😉 to express a sense of "cuteness" and "approval", while those interpretations are not even mentioned on Emojipedia. As such, this website which claims to be "the world's #1 emoji reference site providing up to date and well researched information you can trust" may not be living up to what it promises. The nationality of Emojipedia's past and present contributors – Australian, Irish, and American – may be at the root of such (unintentional?) Anglocentrism in this widely used emoji 'dictionary'.

It is manifest from the statistics that those born as or before Baby Boomers were more prone to failing to recognize the selected emojis and they were also more likely to assign unconventional meanings to those emojis than their young counterparts were. This intrigues one to wonder what the contributing factors could be to give rise this age discrepancy phenomenon. This might be associated with the matter of older people having less experience with CMC, since Baby Boomers were born in the period when technology started to develop and to be introduced to their life, they remember the life before computers and are still finding it increasingly difficult to stand out at work due the fact that they are less computer literate compared to younger workers (Lancaster & Stillman, 2002). Scholars (Krohn, 2004; Myers & Sadaghiani, 2010) have suggested that excluding emojis and emoticons from emails sent to Baby Boomers would be a wise choice on the basis that they might also find it difficult to interpret, understand and use emoticons and emojis. This can also be one of explanations regarding the disparity of emoji recognition and interpretation identified between the young and the old. Rogé and Gabaude (2009) compared visual sensitivity between three age groups (young, middle-aged and elderly). They found that visual sensitivity decreased with age, which, to some extent, could also explain the identified age-related discrepancy in emoji recognition across generations, given the small size of emojis rendered on the phones so that people with less sensitive eyesight might have struggles recognizing them.

5.3 Implications

There are a few possibilities of how the results of this study can be applied in communication. First of all, the findings can be relevant for internal communication in companies and organizations where employees of various ages and nationalities are involved: specifically, the findings can be integrated in training courses relating to communication. Emojis implying sexual euphemisms deserve some additional attention for the reason that nuanced interpretations were identified cross-culturally.

As such, unwanted intimacies in text-based CMC between colleagues (such as emails or chat) may be more quickly identified and dealt with. Secondly, companies should be very careful in using emoji in their marketing messages online, especially if they are operating in a global market: emoji use should be tailored to people from different nationalities or of different age groups, in order to prevent misunderstandings. Last but not the least, the findings can also contribute to interpersonal communication. People should be careful in using emoji when they are communicating with people from a different generation or with people from a different cultural/linguistic/national background.

The results revealed that Chinese emoji users had a higher likelihood of using the selected emojis to indicate meanings that deviated from the conventional interpretations provided on Emojipedia. This might reveal that more extensive efforts should be taken by Emojipedia and other emoji documenting websites alike to expand its repertoire, by collecting emoji meanings not only based on Western users but also users from other national or cultural backgrounds. In the meantime, the findings can also motivate such websites to keep their data updated with the latest emoji interpretation changes initiated by young generations, so as to lower the possibility of misunderstandings in cross-cultural and cross-generational communication caused by nuanced emoji interpretations.

5.4 Limitations and suggestions for further research

Despite the fact that the number of valid responses (N = 129) obtained for this study reached over the minimum sample size, given that the topic of emoji interpretation is relatively under-explored in a cross-cultural and cross-generational context, a much larger sample size would have possibly increased the accuracy of the results and provided even more valuable insights in this field. The scale of the current study and time frame for the data collection, of course, had to fit that of a master's thesis. Based on the fact that the whole data collection procedure lasted only for four weeks, future studies could spare more time to gather data so as to reach higher numbers of participants.

The present study has contributed to this up-and-coming research field with valuable insights into differences between people from the Netherlands and China in what conventional, unconventional, literal, and non-literal meanings they assign to a broad range of emojis. It has even helped to show *how* they assign such meanings, identifying the fascinating phenomenon of homophonic emoji interpretations by Chinese emoji users. For future studies, increased focus will need to be directed towards addressing the interpretation and use of emojis within communication on a global scale. As mentioned in the Chapter two, Koda (2004) found out that some emoticons and emojis selected in the experiment were interpreted entirely differently between Chinese and Japanese subjects. And they also tended to use the selected emoticons and emojis for dissimilar purposes (Koda, 2004). In fact, it shows that there are big differences between Chinese and Japanese emoji users, debunking the claim

that all people from Asian countries or with Asian nationalities have "the same culture" and correspondingly have the same emoji interpretations. It confirms that emoji interpretations between people from all over the world are very diverse, even between countries that are perceived as culturally close together. This suggests that topics such as discrepancy regarding emoji usage/interpretation between culturally close countries, such as countries that belong to the same cluster based on GLOBE framework by Gupta et al. (2002), might worth further examination.

To solicit semantic interpretations, open-entry questions were designed and participants were required to provide one to three meanings in as many words as they would like for each emoji rendering. Even though a pilot test was carried out to examine if all open-entry questions were well-designed enough to elicit desired responses, the biggest challenge was that Chinese participants tended to use succinct adjectives as interpretations for most of the emojis, while this was not the case at all for many Dutch participants, who tended to elaborate scenarios where they would use each emoji in. Consequently, this presented huge burdens to clean and label the data when analyzing. For future research, it is advised to collect interpretations from targeted groups by adopting pilot tests first, and then select most representative interpretations for each emoji rendering and design the items into multiple-choice questions. This way, not only could the heavy burden involved in the data coding be largely reduced, the risk of losing valuable information while labeling could also be minimized to the largest extent. Still, the present study chose to use open-entry questions so as to give participants more freedom in answering and to gather data set with rich emoji interpretations.

The study solely analyzed how individuals interpreted each selected emoji without its interaction with its surrounding texts. However, in text-based CMC, the role that emojis play is supplementary to the messages that texts convey. Thus, future studies could include surrounding texts into examination and examine how emojis alter the undertones that texts intended to convey. On top of that, since Chinese participants tended to incorporate homophonic pun for emoji interpretation, it would be interesting to investigate native speakers of other languages that share similarities with Chinese, such as Japanese, Korean or even Vietnamese to observe if homophonic pun also has a role to play in their emoji interpretations.

As mentioned in the research design section in Chapter three, most emojis were selected based on the researcher and the research supervisor's expertise, intuitions and past emoji research experience on emoji renderings that were mostly likely to trigger nuanced interpretations among individuals. Thus, the selection was, in a way, subject to subjectivity. A different selection may have yielded different results. A theoretical framework regarding cross-culturally and cross-generationally controversial emojis is called for for future research to safeguard the objectivity of emoji selection. Due to the results suggesting that some food/fruit/vegetable-rendering emojis might be used for sexual purposes, it is advised that other emojis in this category such as cucumber

or taco-rendering emojis could also be added in the selection for future analysis. Also, other visual components such as stickers (the bigger and moving version of emojis) are also gaining popularity in diversifying online text-based communication. Therefore, future studies could also expand its focus by including stickers alike and investigate how users from various cultural background or generations might interpret them differently or a usage/interpretation comparison between emojis and stickers rendering the same concept could also be made among users from the same or various cultures or ages.

5.5 Conclusion

Emojis, those colorful symbols, are everywhere these days. They are not only used in CMC to compensate the absence of non-verbal cues, they are also pervasively used as decoration in advertisements, very soon, in movies. Emojis have left the digital realm and are firmly entrenched in today's wider popular culture. Thus, this survey study aimed to investigate nuanced emoji interpretations, comparing Chinese and Dutch individuals aged from 16 to 27 and 57 years old above.

The results indicate that associations were identified between emoji interpretations and age as well as nationality. Further findings show that Chinese emoji users had a higher likelihood of failure to give a meaning to most facial expression/gesture-rendering emojis and they were also more likely to use those emojis to indicate meanings that deviated from the conventional interpretations provided on Emojipedia. Homophony was the major contributing factor of unconventional interpretations for emojis that render fruits/vegetables/animals among the Chinese. Dutch participants tended more to interpret the sexual euphemisms out of fruit/vegetable-rendering emojis.

Additionally, emoji users from the older age group were less able to recognize all emojis rendering fruits/vegetables/objects/animals and were more likely of attaching unconventional interpretations those emojis. For all facial expression and gesture-rendering emojis where an association between age and emoji interpretation was observed, participants aged 58 and older were more likely to fail to interpret any meanings or to convey meanings that were not related to the conventional ones listed on Emojipedia from more than half of the emoji renderings.

With emojis being regarded as essential for online communication in the future and as a "universal visual language" which will allow individuals to communicate with one another globally, identifying variables that may hinder effective communication is of great importance. Due to emoji interpretation differences possibly leading to miscommunication, which could contribute to an increased potential for conflict and even lawsuits, the need to identify variables that could contribute to emoji interpretation differences is vital.

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Appendix

Survey example

I am Yue Lu, a master student in the Linguistics program at Radboud University in the Netherlands. I am conducting my MA thesis research on how people interpret emojis (for example:

In order to participate in this study, you should be Dutch or Chinese, aged between 16-27 years old or 58 upward (including 58).

In the study, you will be asked to fill in the blanks and explain if you recognize these emojis, if you use these emojis yourself, and what you think these emojis mean.

Your responses are completely anonymous and they will not be published or shared.

The survey will approximately take 15 minutes to complete.

Consent
By clicking the "I agree" button, you declare that:
* you have read and understood the information above
* your participation in this study is voluntary
* you are at least 16 years old

If you do not want to participate in this study, you can click the "I do not agree" button.

If you have any questions about the survey, please email me: yue.lu@ru.nl.

Your input is very much appreciated!
□ I agree
□ I do not agree

Demographic information
Q1. What is your gender?
□ Male
□ Female
□ Other
□ Prefer not to say

Q2. Which country are you from?
□ Netherlands
□ China

Q3. What is your age?

Q4. Which phone brand are you currently using?
□ Apple
□ Samsung
□ Huawei
□ Xiaomi/Redmi
□ Vivo
□ OnePlus
□ Google
□ Motorola
□ Oppo
□ others

Emoji interpretation

Q1.1. Do you recognize this emoji?
□ Yes
□ No

Q1.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q1.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q2.1. Do you recognize this emoji?
□ Yes
□ No

Q2.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q2.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q3.1. Do you recognize this emoji?
□ Yes
□ No

Q3.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q3.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q4.1. Do you recognize this emoji?
□ Yes
□ No

Q4.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q4.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q5.1. Do you recognize this emoji?
□ Yes
□ No

Q5.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q5.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q6.1. Do you recognize this emoji?
□ Yes
□ No

Q6.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q6.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q7.1. Do you recognize this emoji?
□ Yes
□ No

Q7.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q7.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q8.1. Do you recognize this emoji?
□ Yes
□ No

Q8.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q8.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q9.1. Do you recognize this emoji?
□ Yes
□ No

Q9.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q9.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q10.1.
Do you recognize this emoji? □ Yes
□ No

Q10.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q10.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q11.1. Do you recognize this emoji?
□ Yes
□ No

Q11.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q11.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q12.1. Do you recognize this emoji?
□ Yes
□ No

Q12.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q12.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q13.1. Do you recognize this emoji?
□ Yes
□ No

Q13.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q13.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q14.1. Do you recognize this emoji?
□ Yes
□ No

Q14.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q14.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q15.1. Do you recognize this emoji?
□ Yes
□ No

Q15.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q15.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q16.1. Do you recognize this emoji?
□ Yes
□ No

Q16.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q16.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q17.1. Do you recognize this emoji?
□ Yes
□ No

Q17.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q17.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q18.1. Do you recognize this emoji?
□ Yes
□ No

Q18.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q18.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q19.1. Do you recognize this emoji?
□ Yes
□ No

Q19.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q19.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q20.1. Do you recognize this emoji?
□ Yes
□ No

Q20.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q20.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q21.1. Do you recognize this emoji?
□ Yes
□ No

Q21.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q21.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q22.1. Do you recognize this emoji?
□ Yes
□ No

Q22.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q22.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q23.1. Do you recognize this emoji?
□ Yes
□ No

Q23.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q23.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q24.1. Do you recognize this emoji?
□ Yes
□ No

Q24.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q24.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

Q25.1. Do you recognize this emoji?
□ Yes
□ No

Q25.2. How often do you use this emoji?
□ very often
□ often
□ sometimes
□ barely
□ never

Q25.3. What does this emoji mean to you?
Please give 1-3 meanings.
If you don't know the meaning, please type a question mark (?) in the blank.

We thank you for your time spent taking this survey. Your response has been recorded.