

ARTIGO

Identifying existing research on Emoji or Emoticons usage in HealthCare: A scoping review

**Tiago Franklin Rodrigues
Lucena**

tfrlucena2@uem.br

Doutor em Artes – Arte e Tecnologia (UnB) e prof. do curso de Comunicação e Multimeios da Universidade Estadual de Maringá, Paraná.

**Alice Loureiro do
Nascimento**

ra90069@uem.br

Graduada em Comunicação e Multimeios (UEM) e atualmente é Gerente de Conteúdo em uma editora de conteúdo digital.

**Leonardo Pestillo de
Oliveira**

leonardo.oliveira@unicesumar.edu.br

Doutor em Psicologia Social (PUC-SP) e professor do Programa de pós graduação em Promoção da Saúde da Universidade Cesumar, Paraná.

Identifying existing research on Emoji or Emoticons usage in HealthCare: A scoping review

Keywords

Emojis

Healthcare

Health communication

Research instrument

Scopus review

Abstract

Emojis and emoticons are graphic icons used primarily in computer-mediated communication with some applications in the healthcare research. We conducted a scoping review to identify and classify the existing literature on emoji or emoticon usage in healthcare research. Method: Four electronic databases were searched for relevant publications dealing with emojis or emoticons. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews was used to guide the process. A total of 158 articles met the inclusion criteria, and among them, 66 records were identified as healthcare research. Results showed a tendency to use emoji/emoticons as tools for emotional assessment in research instruments. In general, there is an opinion/sentiment mining tendency, using emoji/emoticons as data for understanding emotion and behavior displayed online. Some applications highlighted its potential to overcome interpretation between different types of users/individuals and to convince them to adopt healthy habits in some health interventions strategies. Emojis are far more popular than emoticons to identify online users' emotions or opinions. The creation of algorithms for analysis in addition to research that validates these codes as resources for text interpretation in different populations and scenarios will allow them to be applied in larger contexts.

Identificando pesquisas existentes sobre o uso de Emojis ou Emoticons na área da saúde: uma revisão de escopo

Palavras-chave

Emojis

Saúde

Comunicação em saúde

Instrumento de pesquisa

Revisão de escopo

Resumo

Emojis e emoticons são ícones gráficos usados principalmente na comunicação mediada por computador com aplicações na pesquisa na área da saúde. Essa pesquisa do tipo de revisão de escopo foi conduzida para identificar e classificar a literatura existente sobre o uso do emoji e dos emoticons na pesquisa em saúde. Método: Quatro bancos de dados foram pesquisados em busca de publicações relevantes sobre emojis ou emoticons. Foi-se utilizado o guia da Preferred Reporting Items for Systematic reviews and Meta-Analyses para Scoping Reviews durante o processo de coleta e de tabulação dos artigos. Um total de 158 artigos atenderam aos critérios de inclusão e, dentre eles, 66 registros foram identificados como pesquisas em saúde. Os resultados mostraram uma tendência de uso de emojis/emoticons como ferramentas de avaliação emocional em instrumentos de pesquisa. Em geral, há uma tendência de mineração de opinião/sentimento, utilizando emojis/

emoticons como dados para entender emoções e comportamentos exibidos online pelos usuários. Algumas aplicações destacaram seu potencial para superar a interpretação em diferentes tipos de usuários/indivíduos e convencê-los a adotar hábitos saudáveis em algumas estratégias de intervenções em saúde. Os emojis são muito mais populares do que os emoticons para se identificar as emoções ou opiniões dos usuários online. A criação de algoritmos de análise, além de pesquisas que validem esses códigos como recursos para interpretação de textos em diferentes populações e cenários, permitirá que sejam eles possam ser aplicados em contextos mais amplos.

1. Introduction/ Background

The ubiquitous presence of networks and connected digital devices (computers, smartphones, and tablets) enabled the rise of new features and applications for Computer-Mediated Communication (CMC). Digital mediated communication has its distinctions and limitations when compared to the usual face-to-face, since there is a lack of emotional information, such as facial expressions, gestures, tone, pauses, posture, etc. (Derks, Bos, & von Grumbkow, 2008a). Among features applied to overcome these limitations are emojis and emoticons, digitally born paralinguistic devices, which help amplify comprehension and expression in online environments (Holtgraves & Robinson, 2020) features that are lacking when people communicate digitally (e.g., texting).

Although they sound similar, emojis and emoticons are distinct elements. Emoticons (emotion + icon) are a result of the combination of ASCII (American Standard Code for Information Interchange) characters, displayed on computer or smartphone keyboards. They conventionally represent only actions or emotions through facial expressions (Moro, 2017). On the other hand, emojis combine pictographic (a symbol that represents things and objects) and logographic functions (a symbol that can represent or substitute words and ideas). The word emoji is derived from the Japanese terms “e” (image) + “moji” (letter) and it was conceived by a designer who made it available to Japanese cellphones in the '90s (Danesi, 2017).

In the past two decades, these elements have become more spread throughout different platforms (Android, IOS), social networks (Facebook, Instagram, Twitter), messaging apps (WhatsApp, Telegram), and also as a part of the culture (advertising, games, brands). They

have their universal coding system (UNICODE), which holds a register of every emoji made available present or in the past. Given their unique characteristics and popularity, emojis and emoticons have become a topic of interest in diverse areas, such as the law Field (Bich-Carrière, 2019), marketing (G. Das, Wiener, & Kareklas, 2019), communication (Ganster, Eimler, & Krämer, 2012) computer science (Bataineh & Shambour, 2019) among others. In the healthcare field, the research is diverse and heterogeneous, ranging from communication intervention with patients (Al-Rawi et al., 2020; Blunden & Brodsky, 2021; Hu, Zhao, & Wu, 2016; Martin & Grüb, 2020) there is limited evidence of nonverbal behaviors in text-based communication, especially the kinds of unintentional displays central to emotion perception in face-to-face interactions. We investigate whether unintentional emotion cues occur in text-based communication by proposing that communication mistakes (e.g., typos to composing instrument for data collection (Hanson, Elmore, & Swaney-Stueve, 2020; Marengo, Settanni, & Giannotta, 2019; Setty, Srinivasan, Radhakrishna, Melwani, & DR, 2019). This range of applications shows the need for a scoping review, to identify in which ways these communicative tools are being understood and applied, particularly in the healthcare sector. The objective of this scoping review was to identify and classify the academic literature available on the usage and application of emojis and emoticons, with a focus on healthcare research.

Until the submission of this article, we were able to identify 3 systematic reviews published on the subject. Two of which have the goal of identifying literature on emoji only. The authors Troiano and Nante (2018) performed a systematic review with “emoji” as a search keyword in the Pubmed database. During that time, there were only 5 results, among which were articles and reports published between 2015 and 2018, with only one related to

healthcare. Bai, Dan, Mu & Yang (2019) also performed a systematic review with “emoji” as the search keyword in the Web of Science and Google Scholar databases. As a result, they found 167 articles published between 1998 and 2019, with 15 being classified by the authors as related to healthcare (according to their classification: 5 in Medicine and 10 in Psychology). Although the number of articles analyzed was bigger, few were related to the healthcare sector. That can be explained by the author’s choices in search strategy, which did not include healthcare-specific databases (such as Pubmed). Lastly, we identified that Lotfinejad et al. (2020) there has been a growing interest in studying their effects in scientific and health-related topics over the past few years. Infection prevention and control (IPC performed a review, but they failed to specify the search terms or strategies applied, the results, and the type of review enforced. The article focuses on emoji use in infection prevention in public health.

Because emoji and emoticon research in healthcare are not properly mapped and considering the gaps shown by previous reviews, this article reviews the literature on the subject, published between 2008 and May of 2021. Based on previous studies, we opted for including all peer-reviewed articles published in journals, written in English, Portuguese, or Spanish, with full-text availability in the following databases: LILACS, Scielo, Pubmed, and Web of Science. As a search strategy, the terms “emoji” OR “emoticon” were looked for in titles OR abstracts, OR keywords. The choice to broaden our inclusion criteria was taken to guarantee a preliminary notion of research done with emojis and emoticons in all areas, giving us a basis for a further understanding of specific research in the healthcare area. In this way, we were able also to broaden our understanding of the concept of “health”, including research in areas such as Psychology, Psychiatry, Physical therapy, Anesthesiology, Nursing, Neuroscience, and

Nutrition, among others, which may not have appeared if the search terms included “health” (emoji AND health, for example).

2. Methods

2.1. Scoping review objectives and questions

This scoping review aims to identify what the academic literature says/has said about *emojis* and *emoticons* being used in a context related to healthcare by questioning: a) How have emojis and emoticons been applied to healthcare areas? b) How are emojis and emoticons being used in research? and; c) How can we categorize the research found by its nature, field, and usage of emoji/emoticons?

The conduction of this scoping review was based on the framework and principles reported by Arksey and O’Malley (2005) and further recommendations provided by Levac, Coluhoun, & O’Brien (2010). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)- Extension for Scoping Reviews: checklist and explanation were also followed (Tricco et al., 2018). The preliminary search conducted revealed the body of literature on the matter exhibits a complex and heterogeneous nature. As our primary interest was in identifying a large body of literature on the subject of *emoji* and *emoticon* usage in healthcare, the scoping review guidelines helped us map this literature in terms of nature, character, and volume. Following Arksey and O’Malley’s framework, the review followed the basic 5 key steps: Stage 1: Identifying the research question; Stage 2: Identifying relevant studies; Stage 3: Study selection; Stage

4: Charting the data and; Stage 5: Collating, summarizing and reporting the results.

2.2. Protocol and registration

According to the international database of systematic review protocols – Prospero produced by the University of York’s Center for Research and Dissemination (Schiavo, 2019): “*PROSPERO does not currently accept registrations for scoping reviews, literature reviews or mapping reviews. PROSPERO is, therefore, unable to accept your application or provide a registration number. This decision should not stop you from submitting your project for publication to a journal.*”

2.3. Eligibility criteria, information sources and search strategy

- We considered peer-reviewed articles published in journals. We believe adopting this criterion helps us establish a qualitative selection in terms of information quality and credibility of the sources.
- There was no time-of-publication limit as a criterion, first because emoticons and emojis were research topics in different periods, and second, to broaden our results. We got articles dating from 2008 to May 2021.
- The languages accepted as eligible were English, Spanish, and Portuguese. As seen, the other reviews on the topic only took articles in English

Following several preliminary scoping searches, which were intended to gain familiarity with the literature and aid with identifying keywords, four databases were searched for relevant literature published until the date of the last search conducted (20th May 2021). The search on databases was the only method applied to the search. The databases used were Pubmed, for its health approach, Web of Science for its humanities approach, and Scielo and LILACS for their records in Portuguese and Spanish.

The search strategy was tailored to the specific requirements of each database. There were 2 rounds of search, one conducted on 20/11/2020 and a complimentary one six months later – on 20/05/2021 (Table 1).

Key Search Word	Applied	Filters	Search database	Number of publications retrieved 1st search (20/11/2020)	Number of publications retrieved (Only new one selected) 2nd search (20/05/2021)
“emoji” (OR) “emoticon”	Topic	N/A	Web of Science	106	163
“emoji” (OR) “emoticon”	Title/Abstract	N/A	Pubmed	606	13
“emoji” (OR) “emoticon”	Title	N/A	Scielo	1	4
“emoji” (OR) “emoticon”	Abstract	N/A	Scielo	3	2
“emoji” (OR) “emoticon”	Words of the title	N/A	LILACS	1	1
“emoji” (OR) “emoticon”	Words of the abstract	N/A	LILACS	2	4

Table 1. 1st and 2nd SEARCH conducted.

2.4. Selection of sources of evidence

The process of selecting sources of evidence was undertaken in three stages: 1) Initial screening of title and abstract was performed by the first author and based on our eligibility criteria, 2) Second screening of the full text was implemented to categorize the records by their usage of *emoji* and *emoticon* signs. It was performed independently by the first and third authors with an 88% factor of agreement, the discrepancies were then resolved by the second author, 3) Last screening of the full text was performed by the first and second authors to seek out the records which involved *emojis* and *emoticons* in a health context (health was defined here as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). Records that did not meet the criteria applied

in the three stages were excluded. The stages of evidence Selection, Identification, Screening, and Eligibility, according to the PRISMA guidelines, are presented in Table 2.

See Figure 1:

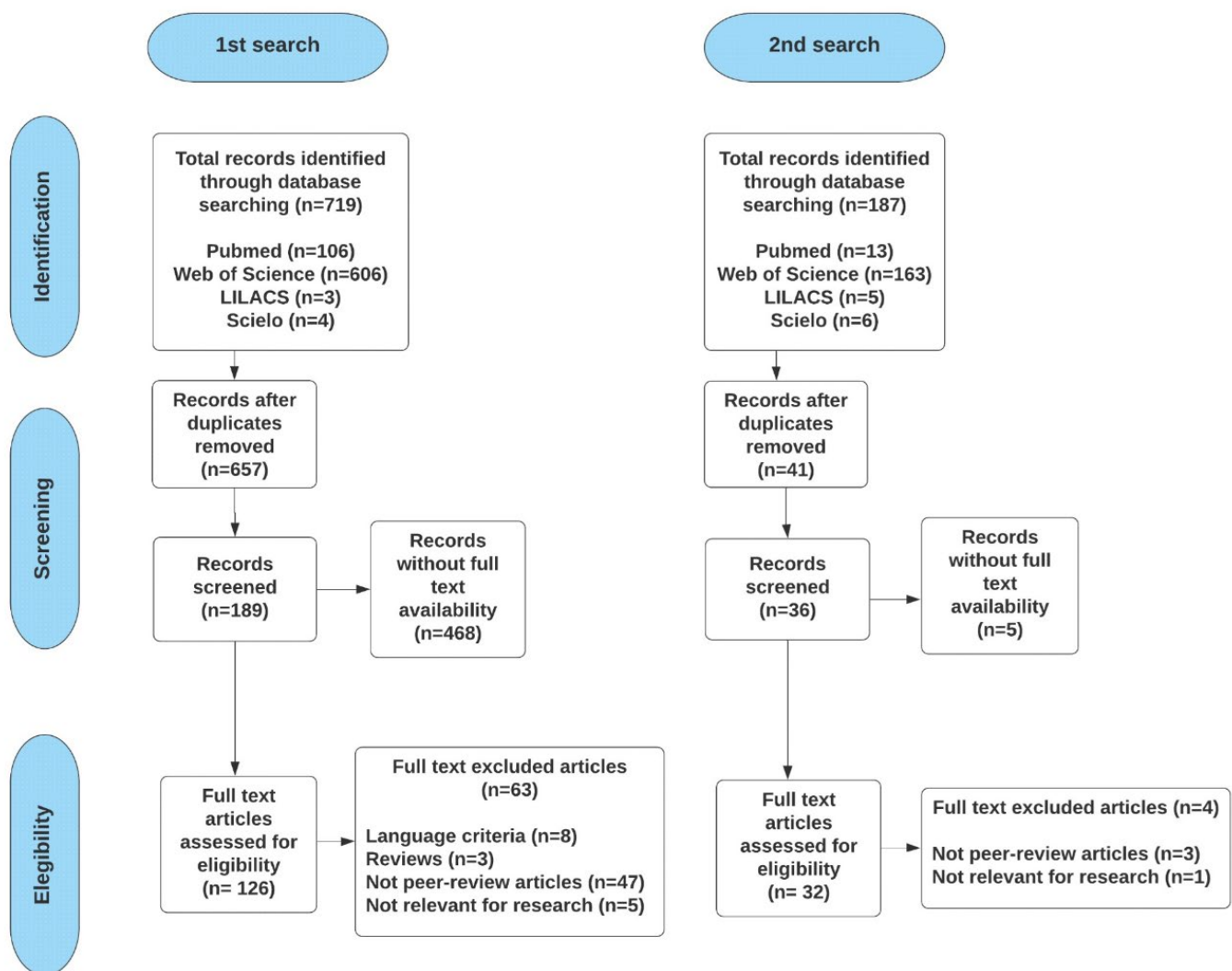


Figure 1. PRISMA flow diagram illustrating the search strategy. This flow diagram provides the phases of article identification and selection, which resulted in identifying 158 articles that were deemed eligible for inclusion in the review. Prepared following Tricco et al., 2018 PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine*. 2018. pp. 467–473. (Tricco et al., 2018)

2.5. Data charting process and synthesis of results

The database search results were exported into a reference manager software – Mendeley Ltd. (version 1.19.8 for Desktop). The duplicate records were excluded using Mendeley’s tool for checking duplicates. The records were all managed through Mendeley

In order to develop categories for the data, an inductive content analysis (Mikkonen & Kääriäinen, 2020) was performed on the articles resulting from the search. The inductive

analysis starts from reading each article by searching the main objective and theme adopted by them (“What is this article about?”), after identifying the themes it is possible to build the thematic categories, and from them, a theory. The identification and classification of the theme in each article were analyzed by two independent researchers who classified them. The analyses were compared between the researchers and showed no discrepancies between them, thus, the analysis of only first of the researchers was considered. Therefore, its purpose is not to test hypotheses but to comprehend the content of each data analyzed (articles). From a full-text review of the articles, we developed classification methods by grouping thematically each one and summarized the data, starting from classification by year of publishing, language, and emoji or emoticon usage.

The following categorization resulted in eight categories based on the usage and application of emojis/emoticons in the research context (Online Applications, Nature of emoji/emoticons, Research instrument, Neural and Cognitive Tests, Health Information Technology, Data for Algorithm Design, Medical Images, and Others). Other 6 categories were developed based on the field of research, taking into consideration the article’s full text, as well as keywords and areas of the journals (Healthcare, Communication, Business/Marketing, Computer Science, Linguistics, and Others). Expanding from this field classification, the articles identified as healthcare-related were divided into eight categories based on themes (Health Information Technology, Nutrition/Food Safety, Neuroscience, Mental Healthcare/well-being, Physiology, Institutional, Biotechnology, and Others).

3. Results

The literature search retrieved 906 citations, and after duplicates were removed, 708 remained. Overall, 225 references were considered potentially eligible. After the full-text assessment, 67 articles were excluded, and 158 were included. Fig. 2 shows the flow chart of articles through the scoping review.

3.1 **Characteristics** **of sources of** **evidence**

A full-text read was performed by the first and second authors to determine the categories, sections, or fields of research identified. Upon categorization, the data showed tendencies in research related to emoji/emoticon usage. Specifically, emojis were found to be the predominant ones used in these studies. The data also indicates a growing field of research in this area, with the majority of results being published recently (2020). Another notable finding is the predominance of research in the ‘Nature of emoji/emoticon’ category. While the majority of published studies treat emojis/emoticons as mere tools for assessing mood or opinion, a considerable amount of research is focused on studying the essence or nature of these devices.

See table 2:

Characteristics	Number (n=158)	Percentage (%)
Year of Publication		
2008	2	1.2%
2009	1	0.6%
2012	2	1.2%
2014	4	2.5%
2015	7	4.4%
2016	8	5%
2017	10	6.3%
2018	16	10.1%
2019	28	17.7%
2020	54	34.1%
Jan-May 2021	26	16.1%
Language		
English	153	96.8%
Spanish	4	2.5%
Portuguese	1	0.6%
Emoji/emoticon usage		
Emoji only	100	63.2%
Emoticon only	42	26.5%
Both	16	10.1%
Categories based on emoji/emoticon usage		
Research instrument	47	29.7%
Monitoring of users	39	24.6%
Nature of emoji/emoticon	35	22.1%
Neural and Cognitive tests	18	11.3%
Data for algorithm design	9	5.6%
HIT/Health Intervention	7	4.4%
Medical Images	2	1.2%
Others	1	0.6%

Characteristics	Number (n=158)	Percentage (%)
Sector		
Healthcare	66	41.7%
Communication	58	36.7%
Business/Marketing	17	10.7%
Computer Science	9	5.6%
Linguistics	4	2.5%
Others	4	2.5%
Sectors in Healthcare		
	Number (n=66)	Percentage (%)
Health Information technology	16	24.2%
Nutrition/Food Safety	13	19.6%
Neuroscience	13	19.6%
Mental healthcare/wellbeing	10	15.1%
Physiology	7	10.6%
Institutional	2	3%
Biotechnology	2	3%
Others	3	4.5%

Table 2. General characteristics of included records (n=158)

4. Discussion

4.1 Summary of evidence

The objective of this scoping review was to identify and classify the academic literature available on the usage and application of emojis and emoticons, with a focus on healthcare research. By focusing first on records from all

fields, we were able to determine the tendencies in research on emoji/emoticon usage from a broader perspective. The discussion was portioned into general characteristics of the records such as year of publication, language, and emoji/emoticon usage, followed by the categorization of the records.

4.1.1: General characteristics

Starting exclusively with emoticons, the research on the field had relatively stable numbers from 2008 with 2 publications (Blunden & Brodsky, 2021; Lee, Tang, Yu, & Cheung,

2008) until 2014, with 4 (Churches, Nicholls, Thiessen, Kohler, & Keage, 2014; Han, Yoo, Kim, McMahon, & Renshaw, 2014; Skovholt, Grønning, & Kankaanranta, 2014; Yus, 2014). In 2015 we observed growth in 7 publications (D'Anna et al., 2015; Hudson et al., 2015; Kralj Novak et al., 2015; Settanni & Marengo, 2015; Siegel et al., 2015; Stark & Crawford, 2015; Vasiljevic, Pechey, & Marteau, 2015) and also the firsts articles regarding emojis (Kralj Novak et al., 2015; Stark & Crawford, 2015). This may be explained by the popularization of smartphones and mobile connectivity networks in the early 2010s, with a consequent increase in emoji usage. Thereafter, we saw an increasing number of publications each year, with 2020 having the most publications that met our eligibility criteria (54 records). Some factors can also explain the growth of emoji popularity, such as the inclusion of emojis on Unicode 6.0 in 2010 (a universal and cross-platform character encoding system) (Unicode, 2010) which allows researchers to identify, collect and analyze emojis from different platforms (Fugate & Franco, 2021; Kaye, Wall, & Malone, 2016; Rodrigues, Lopes, Prada, Thompson, & Garrido, 2017). Also, emojis are now a part of the culture, being present and recognized in Ads, brands, movies, and other cultural materials (Danesi, 2017).

The records showed that most of the research is focused on emoji-only usage. This may be explained by the standardization of the emoji code – mentioned before as opposed to the emoticons, built from ASCII symbols. There is also discussion as to whether the emoticon conveys emotional signals effectively, is less effective than emoji (Boutet, LeBlanc, Chamberland, & Collin, 2021; Kralj Novak et al., 2015) called emojis, that is increasingly being used in mobile communications and social media. In the past two years, over ten billion emojis were used on Twitter. Emojis are Unicode graphic symbols, used as a shorthand

to express concepts and ideas. In contrast to the small number of well-known emoticons that carry clear emotional contents, there are hundreds of emojis. But what are their emotional contents? We provide the first emoji sentiment lexicon, called the Emoji Sentiment Ranking, and draw a sentiment map of the 751 most frequently used emojis. The sentiment of the emojis is computed from the sentiment of the tweets in which they occur. We engaged 83 human annotators to label over 1.6 million tweets in 13 European languages by the sentiment polarity (negative, neutral, or positive, and because emoji can express emotion more realistically than emoticons (Sampietro, 2020). Also, emojis can represent more things rather than facial expressions (Danesi, 2017).

4.1.2: Categories by emoji/emoticon usage and sector

The first classification conducted, by usage and application, revealed that the main use of emoji/emoticons was as a tool for composing research instruments (29.7%). The examples showed emoji usage: on mood scales (De Angeli, Kelly, & O'Neill, 2020; Deubler, Swaney Stueve, Jepsen, & Su Fern, 2020; Machata et al., 2009), questionnaires (Ares & Jaeger, 2017; Jaeger, Lee, & Ares, 2018), and tools for emotional assessment of participants (Ikeda, 2020; Jaeger, Roigard, Jin, Vidal, & Ares, 2019; Lee et al., 2008). Using emojis/emoticons as emotional feedback tools allows a quantification of emotion that helps estimate mood, in both online and offline environments. As such, researchers apply it commonly in situations where feedback is needed for products or services. In this category, most of the records corresponded to research in healthcare or business/marketing sectors, confirming that emojis/emoticons are valuable instruments to access the

user experience. We noticed a tendency of the emoji/emoticon application in the healthcare sector, especially in the nutrition field, where emoji/emoticons were used in questionnaires about food preferences (Ares & Jaeger, 2017; Hendrie et al., 2019; Kytö et al., 2019; Pinto et al., 2020; Ray & Merle, 2020; Vasiljevic et al., 2015), and to compose instruments dealing with children (da Cruz et al., 2021; Galler, Næs, L. Almlí, & Varela, 2020; Hanson et al., 2020; Lima, de Alcantara, Martins, Ares, & Deliza, 2019; Maxwell et al., 2018; Sick, Monteleone, Pierguidi, Ares, & Spinelli, 2020; Siegel et al., 2015; Velardo, Pollard, Shipman, & Booth, 2021).

The use of emojis as assessment tools sometimes was composing pre-designed formularies and questionnaires (De Angeli et al., 2020; Deubler et al., 2020; Hanson et al., 2020; Hendrie et al., 2019) or they are created especially for the research (Ikeda, 2020; Jaeger et al., 2019; Machata et al., 2009; Setty et al., 2019). This shows a tendency to see emojis/emoticons as a way to encapsulate and quantify complex emotions and provide a way to acquire the user or consumer's feedback. Emotions are part of the human ensemble known as the "quantifiable self", which are parts of the self available to be tracked and archived, used commonly in healthcare and marketing strategies (Combs & Barham, 2016; Pentland, 2014). Then, emojis/emoticons are an important piece of information about the individual's feelings which are also a piece of subjective information that is very difficult to extract (Picard, 1997) even by using physiological sensors (Healey, 2011; Olguin, Gloor, & Pentland, 2009; Pantic & Rothkrantz, 1990). In this category, we saw scientists applying emojis/emoticons to extract, collect and archive emotional data about the participants in a more efficient and large-scale way, and to minimize misinterpretations about their experiences.

What can also explain the number of articles that deal with emojis in instruments to

collect data is that, according to Marengo et al. (2019), the development of text-based instruments has its limitations. When it comes to different cultures, varying language skills and educational levels can affect the interpretation capacity of the subjects (Bhattacharya, Singh, & Rillera Marzo, 2019). The authors Bhattacharya et al. (2019) and Marengo et al. (2019) suggest that visual-based instruments, such as those developed with emoji/emoticons, can overcome these limitations and reach a wider range of individuals. In our records, we found research applying emoji/emoticon-based instruments when dealing with different socio-cultural groups: such as children (da Cruz et al., 2021; Galler et al., 2020; Hanson et al., 2020; Jayne, 2019; Lima et al., 2019; Olivos-Jara, Segura-Fernández, Rubio-Pérez, & Felipe-García, 2020; Setty et al., 2019; Sick et al., 2020; Souchet & Aubret, 2016; Van Dam et al., 2019; Vaughn et al., 2020; Velardo et al., 2021), low-literacy populations (Koladycz, Fernandez, Gray, & Marriott, 2018), visually impaired (Machata et al., 2009) and elderly (Koladycz et al., 2018; Kuerbis, van Stolk-Cooke, & Muench, 2017), which may not have the same vocabulary to convey certain emotions.

Applications online, the second category with the most records, focused mainly on the analysis of communication in online environments, not only on online social networks (Al-Rawi et al., 2020; Alanazi, 2019; Albawardi & Jones, 2020; Belcastro, Cantini, Marozzo, Talia, & Trunfio, 2020; Darginavičienė & Ignaitė, 2020; A. Das, 2021; Gabarron et al., 2020; Hu et al., 2016; G.-H. Huang, Chang, Bilgihan, & Okumus, 2020; Hudson et al., 2015; Huesch, Chetlen, Segel, & Schetter, 2017; Kariryaa, Rundé, Heuer, Jungherr, & Schöning, 2022; Konrad, Herring, & Choi, 2020; Kralj Novak et al., 2015; Martin & Grüb, 2020; McShane, Pancer, Poole, & Deng, 2021; Mercier, Senter, Webster, & Henderson Riley, 2020; Mulki, Haddad, Bechikh Ali, & Babaoğlu, 2018; Oleszkiewicz et al., 2017;

Pereira-Kohatsu, Quijano-Sánchez, Liberatore, & Camacho-Collados, 2019; Pitarch, 2021; Ricard, Marsch, Crosier, & Hassanpour, 2018; Settanni & Marengo, 2015; Shaari, 2020; Tian, Batterham, Song, Yao, & Yu, 2018; Wang et al., 2016; Wei, Tsang, Wong, & Lok, 2020) but also how English is strategically mixed with photos, drawings, emoji's, and other languages to create meanings, identities, and relationships. The theoretical framework used to understand these strategies is adopted from 'geosemiotics', an approach to discourse that focuses on how meanings (as well as identities and relationships, messaging apps (Cantamutto & Vela Delfa, 2019; L. Li & Yang, 2018; Steinberg, 2020), games (Babin, 2020) and another kind of online social interactions, especially online social networks (Acker & Murthy, 2020; Arsenault, Blouin, & Guitton, 2016; Blunden & Brodsky, 2021; Chung, Cho, & Park, 2021; Ge-Stadnyk, 2021; Honkanen & Müller, 2021; Moloney, Tuke, Dal Grande, Nielsen, & Chaber, 2021; Tian et al., 2018; Wei et al., 2020) there is limited evidence of nonverbal behaviors in text-based communication, especially the kinds of unintentional displays central to emotion perception in face-to-face interactions. We investigate whether unintentional emotion cues occur in text-based communication by proposing that communication mistakes (e.g., typos. Focusing on user behavior, patterns, and tendencies, many of these researches are concerned with the understanding of the user behavior characteristics, emoji/emoticon's semantical, syntactical, and overall communicative potential, as well as the context in which the emoji/emoticons can be applied to online discourse (Hu et al., 2016; L. Li & Yang, 2018).

This category showed different methodologies to extract and analyze emotional data. The sentiment analysis field, or opinion mining, is a leading tendency in these records, especially in the three categories "Research instruments", "Applications online" and "Data for algorithm

design". It consists of a datafication of sentiment, emotions, behavior, and opinions shared online (Kralj Novak et al., 2015), elements that benefit from the large quantity of data available online. The objective of most of these data mining researches is the construction of sentiment lexicons, and many of them use emoji/emoticons as samples to design and improve machine learning and other computational techniques (Bataineh & Shambour, 2019; Chen et al., 2021; Krommyda, Rigos, Bouklas, & Amditis, 2021; D. Li, Rzepka, Ptaszynski, & Araki, 2020; Peng & Zhao, 2021; Shi et al., 2019; Ullah, Marium, Begum, & Dipa, 2020; Urabe, Rzepka, & Araki, 2021; Wu, Lu, Su, & Wang, 2019). More technical papers dealing with the description of systems designed to analyze the sentiment using emojis and they pointed out some advantages and disadvantages of algorithms built in different perspectives. Basically, the emotional data that came from emojis is mined to feed these sentiment lexicons, aiming to improve the system itself. Our records confirm this tendency of big data extraction for archiving and analyzing user behavior towards different social situations online, such as political discourse (Belcastro et al., 2020; Pitarch, 2021), hate speech (Babin, 2020; Pereira-Kohatsu et al., 2019), experiences in translanguaging (Darginavičienė & Ignaitė, 2020; Wei et al., 2020) and brand engagement (G.-H. Huang et al., 2020; McShane et al., 2021).

The third category with the most records, the nature of emoji/emoticons, discusses the potential of such signs from a communicative and semiotic perspective (Ahumada & Gherlone, 2019; Boutet et al., 2021; Derks, Bos, & von Grumbkow, 2008b; Estrada Chichón & Ortiz Jiménez, 2020; Fischer & Herbert, 2021; Gesselman, Ta, & Garcia, 2019; Holtgraves & Robinson, 2020; Nexø & Strandell, 2020; Ribeiro, Amorim, & Nunes, 2016; Skovholt et al., 2014; Wagner, Marusek, & Yu, 2020; Wicke & Bolognesi, 2020). Just as the universality of

facial expressions has been questioned by some authors (Elfenbein & Ambady, 2002; Jack, Garrod, Yu, Caldara, & Schyns, 2012), the universality of facial emojis/emoticons was also in debate in some cases (Guntuku, Li, Tay, & Ungar, 2019). Not only are there different interpretations of emoji/emoticons across cultures (Estrada Chichón & Ortiz Jiménez, 2020), but some researchers show that gender and age are factors that also impact the emojis/emoticon interpretation (Annamalai & Abdul Salam, 2017; Butterworth, Giuliano, White, Cantu, & Fraser, 2019; Shah & Tewari, 2021). There is also a concern about the different interpretations across platforms (Fugate & Franco, 2021; Ge-Stadnyk, 2021). This may also explain why we faced articles dealing with cognitive and neural tests (see Neural/Cognitive tests” category), trying to answer how these codes are processed and interpreted by different individuals (Barach, Feldman, & Sheridan, 2021; Gantiva et al., 2019; Han et al., 2014; Howman & Filik, 2020; Kim, Lee, Choi, Kim, & Jeong, 2016; Tang, Chen, Zhao, & Zhao, 2020; Thompson, Mackenzie, Leuthold, & Filik, 2016; Weiß, Gutzeit, Rodrigues, Mussel, & Hewig, 2019; Weissman & Tanner, 2018).

Most of the records in the “nature of emoji/emoticon” category argued about how the social and contextual factors heavily impact the emoji usage and understanding. Such discussion is necessary to establish the emoji/emoticon as a valid resource for scientific research, seeing that social nuance may impact the research results and, therefore, its reliability (Derks et al., 2008b; S. Liu & Sun, 2020; Wicke & Bolognesi, 2020).

The Health Information Technology/Health Intervention category deals with healthcare articles that highlight the use of emojis as a health communication tool in different scenarios, such as: in healthcare provider-patient communication (Adarkwah et al., 2019; Bhattacharya et al., 2019; Fane, MacDougall, Jovanovic, Redmond, & Gibbs, 2018; R. Huang

et al., 2020) and campaigns in hygiene promotion and food intake (Franco, da Cunha, & Bianchi, 2021; Mendes, de Jesus Mateus, & Costa, 2020; Patel & Rietveld, 2021). Less expressively, the category “medical images” represent just two records that describe some visual patterns visualized on medical/biological images and named as “emoji-like”, so, not entirely dealing with the code itself (de Mena & Rincon-Limas, 2020; Guarrotxena, García, & Quijada-Garrido, 2018).

4.1.3: Sectors in healthcare

From our second classification of the records, based on the sector or field of research, we were able to identify the articles on the healthcare sector. 9 different subcategories were detected. The foremost category, “Health Information Technology”, representing 24.2% of records, consists of the management of health information data and its exchange between patients, healthcare providers, the government, and others (Bhattacharya et al., 2019). According to the World Health Organization, IT technologies can help collect, store, retrieve, and transfer health information (WHO | World Health Organization, 2015). In our findings, these records showed research that collects and analyzes data on the interaction of the general public with health information systems (Al-Rawi et al., 2020; Arsenault et al., 2016; Bhattacharya et al., 2019; R. Huang et al., 2020; Huesch et al., 2017; Machata et al., 2009; Mercier et al., 2020; Ricard et al., 2018). We saw a particular tendency of monitoring online social networks to understand different aspects of health issues and also the public’s perception or experience with health services (Arsenault et al., 2016; Chung et al., 2021; Gabarron et al., 2020; Huesch et al., 2017; Martin & Grüb, 2020; Ricard et al., 2018; Teoh et al., 2019; Tian et al., 2018).

In this category, we also noticed that emoji/emoticons were being used in the healthcare provider-patient communication (Al-Rawi et al., 2020; Blunden & Brodsky, 2021; Hu et al., 2016; Martin & Grüb, 2020) and as a part of health interventions (Albawardi & Jones, 2020; Kralj Novak et al., 2015; L. Li & Yang, 2018), where health information is delivered with the support of emoji/emoticons. Health interventions and health information delivery were presented in articles from the “Nutrition/Food safety” category (Franco et al., 2021; Hendrie et al., 2019; Lima et al., 2019; Patel & Rietveld, 2021; Ray & Merle, 2020; Siegel et al., 2015; Vasiljevic et al., 2015). We faced some articles that use emoticons/emojis to optimize the health information delivery content (Hendrie et al., 2019; Lima et al., 2019; Siegel et al., 2015), and by doing this, the emoji/emoticon was part of a health intervention strategy.

Essentially, this follows the tendency discussed previously about big data usage in healthcare and reveals a lack of studies that use emojis/emoticons as an independent tool for intervention research. Even in the records that used emoji/emoticons in a research instrument, there is a lack of protagonist. It is often used as a secondary method to assess the participants’ feelings throughout the process. This tendency to use and evaluate emotion through mood scales also has not changed since the first records were published, showing a lack of innovation when it comes to applying such tools.

5. Conclusions and Recommendations

Scoping reviews are useful for synthesizing research evidence and are often used to categorize existing literature in a field, including health themes (Fakoya, McCorry, & Donnelly, 2020). They are particularly useful when

a body of literature exhibits a large, complex, or heterogeneous nature (Peters et al., 2015) as in the case of emoji/emoticons applications.

Although we found that linguistic and cultural studies have been reviewing the validity of emoji/emoticon use as a supposed universal code understood across all genders, ages, cultures, and social backgrounds, its usage in academic research seems to be well established. The review showed a growing tendency of using emojis in research, particularly as facilitators in the research instruments composition, where they are used as a tool for expression and interpretation of mood and complex emotions, and as such, end up having a secondary role in most of these studies.

Future research may rely on the use of emojis in health interventions with diverse populations, as resources for patient health-professional communication, and as data to be analyzed and extracted from interaction in digital environments. The creation of more robust algorithms for analysis in addition to research that validates these codes as resources for text interpretation will allow them to be applied in larger contexts. There was also a lack of research that think about the application of these resources in a more ethical way, including the consequences of reading these data by IT companies, the quantification of emotion in online spaces, and the surveillance capitalism approach (Zuboff, 2020).

5.1 Limitations

The large body of articles read made the classification of our systems and categories possible. We adopted a more inductive content analysis technique to create thematic categories and future different approaches can give another way to classify the articles.

Correlations between article’s themes, nationalities of the authors or journals, year of publication could be next steps.

Also, even by using the university internet proxy some small numbers of articles were still not available for full access. However, the theme of emojis and emoticons appeared in different kinds of publications that we were not able to access at this moment. The references of the analyzed articles were not accessed and the grey literature (Paez, 2017) (thesis, conference proceedings, preprints, presentations, books, newsletter) was also not analyzed, which can open to different topics and themes.

References

- ACKER, A., & MURTHY, D. (2020). What is Venmo? A descriptive analysis of social features in the mobile payment platform. *Telematics and Informatics*, 52, 101429. <https://doi.org/10.1016/j.tele.2020.101429>
- ADARKWAH, C. C., JEGAN, N., HEINZEL-GUTENBRUNNER, M., KÜHNE, F., SIEBERT, U., POPERT, U., ... KÜRWITZ, S. (2019). The Optimizing-Risk-Communication (OptRisk) randomized trial – impact of decision-aid-based consultation on adherence and perception of cardiovascular risk. *Patient Preference and Adherence*, Volume 13, 441–452. <https://doi.org/10.2147/PPA.S197545>
- AHUMADA, E. P. M., & GHERLONE, L. (2019). Ciberespacio y semiótica de la otredad / cyberspace and semiotics of otherness. *DeSignis*, 30, 53–62. <https://doi.org/10.35659/designis.i30p53-62>
- AL-RAWI, A., SIDDIQI, M., MORGAN, R., VANDAN, N., SMITH, J., & WENHAM, C. (2020). COVID-19 and the Gendered Use of Emojis on Twitter: Infodemiology Study. *Journal of Medical Internet Research*, 22(11), e21646. <https://doi.org/10.2196/21646>
- ALANAZI, S. A. (2019). Toward Identifying Features for Automatic Gender Detection: A Corpus Creation and Analysis. *IEEE Access*, 7, 111931–111943. <https://doi.org/10.1109/ACCESS.2019.2932026>
- ALBAWARDI, A., & JONES, R. H. (2020). Vernacular mobile literacies: Multimodality, creativity and cultural identity. *Applied Linguistics Review*, 11(4), 649–676. <https://doi.org/10.1515/applirev-2019-0006>
- ANNAMALAI, S., & ABDUL SALAM, S. N. (2017). Undergraduates' Interpretation on WhatsApp Smiley Emoji. *Jurnal Komunikasi, Malaysian Journal of Communication*, 33(4), 89–103. <https://doi.org/10.17576/JKMJC-2017-3304-06>
- ARES, G., & JAEGER, S. R. (2017). A comparison of five methodological variants of emoji questionnaires for measuring product elicited emotional associations: An application with seafood among Chinese consumers. *Food Research International*, 99(Pt 1), 216–228. <https://doi.org/10.1016/j.foodres.2017.04.028>
- ARKSEY, H., & O'MALLEY, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*, 8(1), 19–32. <https://doi.org/10.1080/1364557032000119616>
- ARSENAULT, M., BLOUIN, M. J., & GUITTON, M. J. (2016). Information quality and dynamics of patients' interactions on tonsillectomy web resources. *Internet Interventions*, 4, 99–104. <https://doi.org/10.1016/j.invent.2016.05.002>
- BABIN, J. J. (2020). Linguistic signaling, emojis, and skin tone in trust games. *PLOS ONE*, 15(6), e0233277. <https://doi.org/10.1371/journal.pone.0233277>
- BAI, Q., DAN, Q., MU, Z., & YANG, M. (2019). A Systematic Review of Emoji: Current Research and Future Perspectives. *Frontiers in Psychology*, Vol. 10, p. 2221. <https://doi.org/10.3389/fpsyg.2019.02221>
- BARACH, E., FELDMAN, L. B., & SHERIDAN, H. (2021). Are emojis processed like words?: Eye movements reveal the time course of semantic processing for emoji-fied text. *Psychonomic Bulletin & Review*, 28(3), 978–991. <https://doi.org/10.3758/s13423-020-01864-y>

- BATAINEH, B. M. A., & SHAMBOUR, M. K. Y. (2019). A Robust Algorithm for Emoji Detection in Smartphone Screenshot Images. *Journal of ICT Research and Applications*, 13(3), 192. <https://doi.org/10.5614/itbj.ict.res.appl.2019.13.3.2>
- BELCASTRO, L., CANTINI, R., MAROZZO, F., TALIA, D., & TRUNFIO, P. (2020). Learning Political Polarization on Social Media Using Neural Networks. *IEEE Access*, 8, 47177–47187. <https://doi.org/10.1109/ACCESS.2020.2978950>
- BHATTACHARYA, S., SINGH, A., & RILLERA Marzo, R. (2019). Delivering emoji/icon-based universal health education messages through smartphones. *AIMS Public Health*, 6(3), 242–247. <https://doi.org/10.3934/publichealth.2019.3.242>
- BICH-CARRIÈRE, L. (2019). Say it with [A Smiling Face with Smiling Eyes]: Judicial Use and Legal Challenges with Emoji Interpretation in Canada. In *International Journal for the Semiotics of Law* (Vol. 32). <https://doi.org/10.1007/s11196-018-9594-5>
- BLUNDEN, H., & BRODSKY, A. (2021). Beyond the Emoticon: Are There Unintentional Cues of Emotion in Email? *Personality and Social Psychology Bulletin*, 47(4), 565–579. <https://doi.org/10.1177/0146167220936054>
- BOUTET, I., LEBLANC, M., CHAMBERLAND, J. A., & COLLIN, C. A. (2021). Emojis influence emotional communication, social attributions, and information processing. *Computers in Human Behavior*, 119, 106722. <https://doi.org/10.1016/j.chb.2021.106722>
- BUTTERWORTH, S. E., GIULIANO, T. A., WHITE, J., CANTU, L., & FRASER, K. C. (2019). Sender Gender Influences Emoji Interpretation in Text Messages. *Frontiers in Psychology*, 10, 784. <https://doi.org/10.3389/fpsyg.2019.00784>
- CANTAMUTTO, L., & VELA DELFA, C. (2019). Emojis frecuentes en las interacciones por whatsapp. *Círculo de Lingüística Aplicada a La Comunicación*, 77, 171–186. <https://doi.org/10.5209/CLAC.63282>
- CHEN, Z., CAO, Y., YAO, H., LU, X., PENG, X., MEI, H., & LIU, X. (2021). Emoji-powered Sentiment and Emotion Detection from Software Developers' Communication Data. *ACM Transactions on Software Engineering and Methodology*, 30(2), 1–48. <https://doi.org/10.1145/3424308>
- CHUNG, K., CHO, H. Y., & PARK, J. Y. (2021). A Chatbot for Perinatal Women's and Partners' Obstetric and Mental Health Care: Development and Usability Evaluation Study. *JMIR Medical Informatics*, 9(3), e18607. <https://doi.org/10.2196/18607>
- CHURCHES, O., NICHOLLS, M., THIESSEN, M., KOHLER, M., & KEAGE, H. (2014). Emoticons in mind: An event-related potential study. *Social Neuroscience*, 9(2), 196–202. <https://doi.org/10.1080/17470919.2013.873737>
- COMBS, C. D., & BARHAM, S. R. (2016). The Quantifiable Self. In *The Digital Patient* (pp. 63–72). <https://doi.org/10.1002/9781118952788.ch6>
- D'ANNA, C., SCHMID, M., BIBBO, D., BERTOLLO, M., COMANI, S., & CONFORTO, S. (2015). The Effect of Continuous and Discretized Presentations of Concurrent Augmented Visual Biofeedback on Postural Control in Quiet Stance. *PLOS ONE*, 10(7), e0132711. <https://doi.org/10.1371/journal.pone.0132711>
- DA CRUZ, M. F., ROCHA, R. S., SILVA, R., FREITAS, M. Q., PIMENTEL, T. C., ESMERINO, E. A., ... MAIA, L. C. (2021). Probiotic fermented milks: Children's emotional responses using a product-specific emoji list. *Food Research International*, 143, 110269. <https://doi.org/10.1016/j.foodres.2021.110269>

- DANESI, M. (2017). *The Semiotics of Emoji: the rise of visual language in the age of the Internet*. London: Bloomsbury.
- DARGINAVIČIENĖ, I., & IGNOTAITĖ, I. (2020). Code-switching in the computer-mediated communication. *RUDN Journal of Sociology*, 20(2), 405–415. <https://doi.org/10.22363/2313-2272-2020-20-2-405-415>
- DAS, A. (2021). How has the coronavirus (COVID-19) pandemic affected global emoji usage? *Journal of Human Behavior in the Social Environment*, 31(1–4), 425–434. <https://doi.org/10.1080/10911359.2020.1838383>
- DAS, G., WIENER, H. J. D., & KAREKLAS, I. (2019). To emoji or not to emoji? Examining the influence of emoji on consumer reactions to advertising. *Journal of Business Research*, 96(December 2017), 147–156. <https://doi.org/10.1016/j.jbusres.2018.11.007>
- DE ANGELI, D., KELLY, R. M., & O'NEILL, E. (2020). Beyond Happy or Not: Using Emoji to Capture Visitors' Emotional Experience. *Curator: The Museum Journal*, 63(2), 167–191. <https://doi.org/10.1111/cura.12352>
- DE MENA, L., & RINCON-LIMAS, D. E. (2020). PhotoGal4: A Versatile Light-Dependent Switch for Spatiotemporal Control of Gene Expression in *Drosophila* Explants. *iScience*, 23(7), 101308. <https://doi.org/10.1016/j.isci.2020.101308>
- DERKS, D., BOS, A. E. R., & VON GRUMBKOW, J. (2008a). Emoticons and Online Message Interpretation. *Social Science Computer Review*, 26(3), 379–388. <https://doi.org/10.1177/0894439307311611>
- DERKS, D., BOS, A. E. R., & VON GRUMBKOW, J. (2008b). Emoticons in Computer-Mediated Communication: Social Motives and Social Context. *CyberPsychology & Behavior*, 11(1), 99–101. <https://doi.org/10.1089/cpb.2007.9926>
- DEUBLER, G., SWANEY STUEVE, M., JEPSEN, T., & SU FERN, B. P. (2020). The K State emoji scale. *Journal of Sensory Studies*, 35(1). <https://doi.org/10.1111/joss.12545>
- ELFENBEIN, H. A., & AMBADY, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin*, 128(2), 203–235. <https://doi.org/10.1037/0033-2909.128.2.203>
- ESTRADA CHICHÓN, J. L., & ORTIZ JIMÉNEZ, M. (2020). Valoración de las posibilidades del desarrollo de la competencia escrita en inglés como lengua extranjera a partir de la aplicación de emoji como elementos conceptuales / Assessment of the possibilities of writing skills development in English as a foreign. *Texto Livre: Linguagem e Tecnologia*, 13(1), 96–119. <https://doi.org/10.17851/1983-3652.13.1.96-119>
- FAKOYA, O. A., MCCORRY, N. K., & DONNELLY, M. (2020). Loneliness and social isolation interventions for older adults: a scoping review of reviews. *BMC Public Health*, 20(1), 129. <https://doi.org/10.1186/s12889-020-8251-6>
- FANE, J., MACDOUGALL, C., JOVANOVIĆ, J., Redmond, G., & GIBBS, L. (2018). Exploring the use of emoji as a visual research method for eliciting young children's voices in childhood research. *Early Child Development and Care*, 188(3), 359–374. <https://doi.org/10.1080/03004430.2016.1219730>
- FISCHER, B., & HERBERT, C. (2021). Emoji as Affective Symbols: Affective Judgments of Emoji, Emoticons, and Human Faces Varying in Emotional Content. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.645173>

- FRANCO, M. R., DA CUNHA, L. R., & BIANCHI, R. F. (2021). Janus principle applied to food safety: An active two-faced indicator label for tracking meat freshness. *Sensors and Actuators B: Chemical*, 333, 129466. <https://doi.org/10.1016/j.snb.2021.129466>
- FUGATE, J. M. B., & FRANCO, C. L. (2021). Implications for Emotion: Using Anatomically Based Facial Coding to Compare Emoji Faces Across Platforms. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.605928>
- GABARRON, E., LARBI, D., DORRONZORO, E., HASVOLD, P. E., WYNN, R., & ÅRSAND, E. (2020). Factors Engaging Users of Diabetes Social Media Channels on Facebook, Twitter, and Instagram: Observational Study. *Journal of Medical Internet Research*, 22(9), e21204. <https://doi.org/10.2196/21204>
- GALLER, M., NÆS, T., L. ALMLI, V., & VARELA, P. (2020). How children approach a CATA test influences the outcome. Insights on ticking styles from two case studies with 6–9-year old children. *Food Quality and Preference*, 86, 104009. <https://doi.org/10.1016/j.foodqual.2020.104009>
- GANSTER, T., Eimler, S. C., & KRÄMER, N. C. (2012). Same Same But Different!? The Differential Influence of Smilies and Emoticons on Person Perception. *Cyberpsychology, Behavior, and Social Networking*, 15(4), 226–230. <https://doi.org/10.1089/cyber.2011.0179>
- GANTIVA, C., ZARABANDA, A., RICAURTE, J., CALDERÓN, L., ORTIZ, K., & CASTILLO, K. (2019). Efecto de la empatía afectiva sobre el procesamiento cortical de emojis / Effect of Affective Empathy on the Cortical Processing of Emojis. *Pensamiento Psicológico*, 17(1), 7–17. <https://doi.org/10.11144/javerianacali.PPSI17-1.eeap>
- GE-STADNYK, J. (2021). Communicative functions of emoji sequences in the context of self-presentation: A comparative study of Weibo and Twitter users. *Discourse & Communication*, 15(4), 369–387. <https://doi.org/10.1177/17504813211002038>
- GESSELMAN, A. N., TA, V. P., & GARCIA, J. R. (2019). Worth a thousand interpersonal words: Emoji as affective signals for relationship-oriented digital communication. *PLOS ONE*, 14(8), e0221297. <https://doi.org/10.1371/journal.pone.0221297>
- GUARROTXENA, N., GARCÍA, O., & QUIJADA-GARRIDO, I. (2018). Synthesis of Au@polymer nanohybrids with transitioned core-shell morphology from concentric to eccentric Emoji-N or Janus nanoparticles. *Scientific Reports*, 8(1), 5721. <https://doi.org/10.1038/s41598-018-24078-8>
- GUNTUKU, S. C., LI, M., TAY, L., & UNGAR, L. H. (2019). Studying Cultural Differences in Emoji Usage across the East and the West. *Proceedings of the Thirteenth International AAAI Conference on Web and Social Media*, (ICWSM), 226–235. Retrieved from <https://ojs.aaai.org/index.php/ICWSM/article/view/3224>
- HAN, D. H., YOO, H. J., KIM, B. N., MCMAHON, W., & RENSHAW, P. F. (2014). Brain Activity of Adolescents with High Functioning Autism in Response to Emotional Words and Facial Emoticons. *PLoS ONE*, 9(3), e91214. <https://doi.org/10.1371/journal.pone.0091214>
- HANSON, J., ELMORE, J., & SWANEY-STUEVE, M. (2020). Food Trying and Liking Related to Grade Level and Meal Participation. *International Journal of Environmental Research and Public Health*, 17(16), 5641. <https://doi.org/10.3390/ijerph17165641>

- HEALEY, J. (2011). *Recording Affect in the Field : Towards Methods and Metrics for Improving Ground Truth Labels*. 107–116.
- HENDRIE, G. A., JAMES-MARTIN, G., WILLIAMS, G., BRINDAL, E., WHYTE, B., & CROOK, A. (2019). The Development of VegEze: Smartphone App to Increase Vegetable Consumption in Australian Adults. *JMIR Formative Research*, 3(1), e10731. <https://doi.org/10.2196/10731>
- HOLTGRAVES, T., & ROBINSON, C. (2020). Emoji can facilitate recognition of conveyed indirect meaning. *PLOS ONE*, 15(4), e0232361. <https://doi.org/10.1371/journal.pone.0232361>
- HONKANEN, M., & MÜLLER, J. (2021). Interjections and emojis in Nigerian online communication. *World Englishes*, weng.12544. <https://doi.org/10.1111/weng.12544>
- HOWMAN, H. E., & FILIK, R. (2020). The role of emoticons in sarcasm comprehension in younger and older adults: Evidence from an eye-tracking experiment. *Quarterly Journal of Experimental Psychology*, 73(11), 1729–1744. <https://doi.org/10.1177/1747021820922804>
- HU, Y., ZHAO, J., & WU, J. (2016). Emoticon-Based Ambivalent Expression: A Hidden Indicator for Unusual Behaviors in Weibo. *PLOS ONE*, 11(1), e0147079. <https://doi.org/10.1371/journal.pone.0147079>
- HUANG, G.-H., CHANG, C.-T., BILGIHAN, A., & OKUMUS, F. (2020). Helpful or harmful? A double-edged sword of emoticons in online review helpfulness. *Tourism Management*, 81, 104135. <https://doi.org/10.1016/j.tourman.2020.104135>
- HUANG, R., LIU, N., NICDAO, M. A., MIKAHEAL, M., BALDACCHINO, T., ALBEOS, A., ... KIM, J. (2020). Emotion sharing in remote patient monitoring of patients with chronic kidney disease. *Journal of the American Medical Informatics Association*, 27(2), 185–193. <https://doi.org/10.1093/jamia/ocz183>
- HUDSON, M. B., NICOLAS, S. C., HOWSER, M. E., LIPSETT, K. E., ROBINSON, I. W., POPE, L. J., ... Friedman, D. R. (2015). Examining How Gender and Emoticons Influence Facebook Jealousy. *Cyberpsychology, Behavior, and Social Networking*, 18(2), 87–92. <https://doi.org/10.1089/cyber.2014.0129>
- HUESCH, M., CHETLEN, A., SEGEL, J., & SCHETTER, S. (2017). Frequencies of Private Mentions and Sharing of Mammography and Breast Cancer Terms on Facebook: A Pilot Study. *Journal of Medical Internet Research*, 19(6), e201. <https://doi.org/10.2196/jmir.7508>
- IKEDA, S. (2020). Influence of Color on Emotion Recognition Is Not Bidirectional: An Investigation of the Association Between Color and Emotion Using a Stroop-Like Task. *Psychological Reports*, 123(4), 1226–1239. <https://doi.org/10.1177/0033294119850480>
- JACK, R. E., GARROD, O. G. B., Yu, H., CALDARA, R., & SCHYNS, P. G. (2012). Facial expressions of emotion are not culturally universal. *Proceedings of the National Academy of Sciences*, 109(19), 7241–7244. <https://doi.org/10.1073/pnas.1200155109>
- JAEGER, S. R., LEE, P.-Y., & ARES, G. (2018). Product involvement and consumer food-elicited emotional associations: Insights from emoji questionnaires. *Food Research International*, 106, 999–1011. <https://doi.org/10.1016/j.foodres.2018.01.024>

- JAEGER, S. R., ROIGARD, C. M., JIN, D., VIDAL, L., & ARES, G. (2019). Valence, arousal and sentiment meanings of 33 facial emoji: Insights for the use of emoji in consumer research. *Food Research International*, 119, 895–907. <https://doi.org/10.1016/j.foodres.2018.10.074>
- JAYNE, J. (2019). Incorporation of Edutainment Into Intervention and Evaluation: The Jump With Jill (JWJ) Program. *Frontiers in Public Health*, 7, 163. <https://doi.org/10.3389/fpubh.2019.00163>
- KARIRYAA, A., RUNDÉ, S., HEUER, H., JUNGHER, A., & SCHÖNING, J. (2022). The Role of Flag Emoji in Online Political Communication. *Social Science Computer Review*, 40(2), 367–387. <https://doi.org/10.1177/0894439320909085>
- KAYE, L. K., WALL, H. J., & MALONE, S. A. (2016). “Turn that frown upside-down”: A contextual account of emoticon usage on different virtual platforms. *Computers in Human Behavior*, 60, 463–467. <https://doi.org/10.1016/j.chb.2016.02.088>
- KIM, K. W., LEE, S. W., CHOI, J., KIM, T. M., & JEONG, B. (2016). Neural correlates of text based emoticons: a preliminary fMRI study. *Brain and Behavior*, 6(8). <https://doi.org/10.1002/brb3.500>
- KOLADY CZ, R., FERNANDEZ, G., GRAY, K., & MARRIOTT, H. (2018). The Net Promoter Score (NPS) for Insight Into Client Experiences in Sexual and Reproductive Health Clinics. *Global Health: Science and Practice*, 6(3), 413–424. <https://doi.org/10.9745/GHSP-D-18-00068>
- KONRAD, A., HERRING, S. C., & CHOI, D. (2020). Sticker and Emoji Use in Facebook Messenger: Implications for Graphicon Change. *Journal of Computer-Mediated Communication*, 25(3), 217–235. <https://doi.org/10.1093/jcmc/zmaa003>
- KRALJ NOVAK, P., SMAILOVIĆ, J., SLUBAN, B., MOZETIČ, I., NOVAK, P. K., SMAILOVIĆ, J., ... MOZETIČ, I. (2015). Sentiment of Emojis. *PLOS ONE*, 10(12), e0144296. <https://doi.org/10.1371/journal.pone.0144296>
- KROMMYDA, M., RIGOS, A., BOUKLAS, K., & AMDITIS, A. (2021). An Experimental Analysis of Data Annotation Methodologies for Emotion Detection in Short Text Posted on Social Media. *Informatics*, 8(1), 19. <https://doi.org/10.3390/informatics8010019>
- KUERBIS, A., VAN STOLK-COOKE, K., & MUENCH, F. (2017). An exploratory study of mobile messaging preferences by age: Middle-aged and older adults compared to younger adults. *Journal of Rehabilitation and Assistive Technologies Engineering*, 4, 205566831773325. <https://doi.org/10.1177/2055668317733257>
- KYTÖ, E., BULT, H., AARTS, E., WEGMAN, J., RUIJSCHOP, R. M. A. J., & MUSTONEN, S. (2019). Comparison of explicit vs. implicit measurements in predicting food purchases. *Food Quality and Preference*, 78, 103733. <https://doi.org/10.1016/j.foodqual.2019.103733>
- LEE, A. C. K., TANG, S. W., YU, G. K. K., & CHEUNG, R. T. F. (2008). The smiley as a simple screening tool for depression after stroke: A preliminary study. *International Journal of Nursing Studies*, 45(7), 1081–1089. <https://doi.org/10.1016/j.ijnurstu.2007.05.008>
- LEVAC, D., COLQUHOUN, H., & O'BRIEN, K. K. (2010). Scoping studies: advancing the methodology. *Implementation Science*, 5(1), 69. <https://doi.org/10.1186/1748-5908-5-69>

- LI, D., RZEPKA, R., PTASZYNSKI, M., & ARAKI, K. (2020). HEMOS: A novel deep learning-based fine-grained humor detecting method for sentiment analysis of social media. *Information Processing & Management*, 57(6), 102290. <https://doi.org/10.1016/j.ipm.2020.102290>
- LI, L., & YANG, Y. (2018). Pragmatic functions of emoji in internet-based communication---a corpus-based study. *Asian-Pacific Journal of Second and Foreign Language Education*, 3(1), 16. <https://doi.org/10.1186/s40862-018-0057-z>
- LIMA, M., DE ALCANTARA, M., MARTINS, I. B. A. A., ARES, G., & DELIZA, R. (2019). Can front-of-pack nutrition labeling influence children's emotional associations with unhealthy food products? An experiment using emoji. *Food Research International*, 120, 217–225. <https://doi.org/10.1016/j.foodres.2019.02.027>
- LIU, C., TAN, X., ZHOU, T., ZHANG, W., LIU, J., & LU, X. (2022). Emoji use in China: popularity patterns and changes due to COVID-19. *Applied Intelligence*. <https://doi.org/10.1007/s10489-022-03195-y>
- LIU, S., & SUN, R. (2020). To Express or to End? Personality Traits Are Associated With the Reasons and Patterns for Using Emojis and Stickers. *Frontiers in Psychology*, 11, 1076. <https://doi.org/10.3389/fpsyg.2020.01076>
- LOTFINEJAD, N., ASSADI, R., AELAMI, M. H., & PITTET, D. (2020). Emojis in public health and how they might be used for hand hygiene and infection prevention and control. *Antimicrobial Resistance & Infection Control*, 9(1), 27. <https://doi.org/10.1186/s13756-020-0692-2>
- LU, X., AI, W., CHEN, Z., CAO, Y., & MEI, Q. (2022). Emojis predict dropouts of remote workers: An empirical study of emoji usage on GitHub. *PLOS ONE*, 17(1), e0261262. <https://doi.org/10.1371/journal.pone.0261262>
- MACHATA, A. M., KABON, B., WILLSCHE, H., FÄSSLER, K., GUSTORFF, B., MARHOFER, P., & CURATOLO, M. (2009). A new instrument for pain assessment in the immediate postoperative period. *Anaesthesia*, 64(4), 392–398. <https://doi.org/10.1111/j.1365-2044.2008.05798.x>
- MARENGO, D., SETTANNI, M., & GIANNOTTA, F. (2019). “Development and preliminary validation of an image-based instrument to assess depressive symptoms”. *Psychiatry Research*, 279, 180–185. <https://doi.org/10.1016/j.psychres.2019.02.059>
- MARTIN, S., & GRÜB, B. (2020). Intensive WOM-behavior in the healthcare sector – the case of an Austrian hospital's Facebook site. *International Review on Public and Nonprofit Marketing*, 17(3), 331–352. <https://doi.org/10.1007/s12208-020-00250-7>
- MAXWELL, A. E., CASTILLO, L., ARCE, A. A., DE ANDA, T., MARTINS, D., & MCCARTHY, W. J. (2018). Eating Veggies Is Fun! An Implementation Pilot Study in Partnership With a YMCA in South Los Angeles. *Preventing Chronic Disease*, 15, 180150. <https://doi.org/10.5888/pcd15.180150>
- MCSHANE, L., PANCER, E., POOLE, M., & DENG, Q. (2021). Emoji, Playfulness, and Brand Engagement on Twitter. *Journal of Interactive Marketing*, 53, 96–110. <https://doi.org/10.1016/j.intmar.2020.06.002>
- MENDES, P. M. E., DE JESUS MATEUS, L. V., & COSTA, P. (2020). Does a Playful Intervention Promote Hand Hygiene? Compliance and Educator's Beliefs about Hand Hygiene at a Daycare Center. *Journal of Pediatric Nursing*, 51, e64–e68. <https://doi.org/10.1016/j.pedn.2019.08.017>

- MERCIER, R. J., SENTER, K., WEBSTER, R., & HENDERSON RILEY, A. (2020). Instagram Users' Experiences of Miscarriage. *Obstetrics & Gynecology*, 135(1), 166–173. <https://doi.org/10.1097/AOG.0000000000003621>
- MIKKONEN, K., & KÄÄRIÄINEN, M. (2020). Content Analysis in Systematic Reviews. In *The Application of Content Analysis in Nursing Science Research* (pp. 105–115). https://doi.org/10.1007/978-3-030-30199-6_10
- MOLONEY, G. K., TUKE, J., DAL GRANDE, E., NIELSEN, T., & CHABER, A.-L. (2021). Is YouTube promoting the exotic pet trade? Analysis of the global public perception of popular YouTube videos featuring threatened exotic animals. *PLOS ONE*, 16(4), e0235451. <https://doi.org/10.1371/journal.pone.0235451>
- MORO, G. H. M. (2017). Emoticons, emojis e ícones como modelo de comunicação e linguagem: relações culturais e tecnológicas / Emoticons, emojis and icons as a model of communication and language: cultural and technological relations. *Revista de Estudos Da Comunicação*, 17(43), 53–70. <https://doi.org/10.7213/rec.v17i43.22552>
- MULKI, H., HADDAD, H., BECHIKH ALI, C., & BABAOĞLU, I. (2018). Tunisian Dialect Sentiment Analysis: A Natural Language Processing-based Approach. *Computación y Sistemas*, 22(4). <https://doi.org/10.13053/cys-22-4-3009>
- NEXØ, L. A., & STRANDELL, J. (2020). Testing, filtering, and insinuating: Matching and attunement of emoji use patterns as non-verbal flirting in online dating. *Poetics*, 83, 101477. <https://doi.org/10.1016/j.poetic.2020.101477>
- OLESZKIEWICZ, A., KARWOWSKI, M., PISANSKI, K., SOROKOWSKI, P., SOBRADO, B., & SOROKOWSKA, A. (2017). Who uses emoticons? Data from 86 702 Facebook users. *Personality and Individual Differences*, 119, 289–295. <https://doi.org/10.1016/j.paid.2017.07.034>
- OLGUIN, D. O., GLOOR, P. A., & PENTLAND, A. (2009). Wearable sensors for pervasive healthcare management. *2009 3rd International Conference on Pervasive Computing Technologies for Healthcare*, 66, 1–4. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5191205
- OLIVOS-JARA, P., SEGURA-FERNÁNDEZ, R., RUBIO-PÉREZ, C., & FELIPE-GARCÍA, B. (2020). Biophilia and Biophobia as Emotional Attribution to Nature in Children of 5 Years Old. *Frontiers in Psychology*, 11, 511. <https://doi.org/10.3389/fpsyg.2020.00511>
- PAEZ, A. (2017). Gray literature: An important resource in systematic reviews. *Journal of Evidence-Based Medicine*, 10(3), 233–240. <https://doi.org/10.1111/jebm.12266>
- PANTIC, M., & ROTHKRANTZ, L. J. M. (1990). Affect-sensitive Multi-Modal monitoring in ubiquitous computing: Advances and Challenges. *AAAI/IEEE Int'l Conf. on Enterprise Information Systems 2001*, 466–474.
- PATEL, P. C., & RIETVELD, C. A. (2021). The Impact of the Public Disclosure of Curved Inspection Scores Using Emojis on Hygiene Violations in Food Establishments. *Cornell Hospitality Quarterly*, 62(4), 455–467. <https://doi.org/10.1177/1938965520935398>
- PENG, D., & ZHAO, H. (2021). Seq2Emoji: A hybrid sequence generation model for short text emoji prediction. *Knowledge-Based Systems*, 214, 106727. <https://doi.org/10.1016/j.knosys.2020.106727>

- PENTLAND, A. S. (2014). *Social Physics: how good ideas spread – the lessons from a new science*. New York: Penguin Books.
- PEREIRA-KOHATSU, J. C., QUIJANO-SÁNCHEZ, L., LIBERATORE, F., & CAMACHO-COLLADOS, M. (2019). Detecting and Monitoring Hate Speech in Twitter. *Sensors*, 19(21), 4654. <https://doi.org/10.3390/s19214654>
- PETERS, M. D. J., GODFREY, C. M., KHALIL, H., MCINERNEY, P., PARKER, D., & SOARES, C. B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare*, 13(3), 141–146. <https://doi.org/10.1097/XEB.0000000000000050>
- PICARD, R. W. (1997). *Affective Computing* (1st ed.; MIT, Ed.). Cambridge, MA: MIT Press.
- PINTO, V. R. A., TEIXEIRA, C. G., LIMA, T. S., DE ALMEIDA PRATA, E. R. B., VIDIGAL, M. C. T. R., MARTINS, E., ... CARVALHO, A. F. de. (2020). Health beliefs towards kefir correlate with emotion and attitude: A study using an emoji scale in Brazil. *Food Research International*, 129, 108833. <https://doi.org/10.1016/j.foodres.2019.108833>
- PITARCH, R. C. (2021). Spanish politicians in Twitter: A linguistic analysis of their written discourse. *Ibérica*, 40(1), 195–216. Retrieved from <https://doaj.org/article/bd456b929a8f4b078f7c30bedadaf549>
- RAY, E. C., & MERLE, P. F. (2020). Disgusting Face, Disease-Ridden Place?: Emoji Influence on the Interpretation of Restaurant Inspection Reports. *Health Communication*, 36(14), 1867–1878. <https://doi.org/10.1080/10410236.2020.1802867>
- RIBEIRO, J. da C. L., AMORIM, R. J. R., & NUNES, R. dos R. (2016). Selfies, emojis, likes: representações voláteis e leituras líquidas na era digital / Selfies, emojis, likes: volatile representations and liquid readings in the digital age. *Texto Livre: Linguagem e Tecnologia*, 9(2), 161–173. <https://doi.org/10.17851/1983-3652.9.2.161-173>
- RICARD, B. J., MARSCH, L. A., CROSIER, B., & HASSANPOUR, S. (2018). Exploring the Utility of Community-Generated Social Media Content for Detecting Depression: An Analytical Study on Instagram. *Journal of Medical Internet Research*, 20(12), e11817. <https://doi.org/10.2196/11817>
- RODRIGUES, D., LOPES, D., PRADA, M., THOMPSON, D., & GARRIDO, M. V. (2017). A frown emoji can be worth a thousand words: Perceptions of emoji use in text messages exchanged between romantic partners. *Telematics and Informatics*, 34(8), 1532–1543. <https://doi.org/10.1016/j.tele.2017.07.001>
- SAMPIETRO, A. (2020). Use and Interpretation of Emoji in Electronic-Mediated Communication: A Survey. *Visual Communication Quarterly*, 27(1), 27–39. <https://doi.org/10.1080/15551393.2019.1707086>
- SCHIAVO, J. H. (2019). PROSPERO: An International Register of Systematic Review Protocols. *Medical Reference Services Quarterly*, 38(2), 171–180. <https://doi.org/10.1080/02763869.2019.1588072>
- SETTANNI, M., & MARENGO, D. (2015). Sharing feelings online: studying emotional well-being via automated text analysis of Facebook posts. *Frontiers in Psychology*, 6. <https://doi.org/10.3389/fpsyg.2015.01045>

- SETTY, J. V., SRINIVASAN, I., RADHAKRISHNA, S., MELWANI, A. M., & DR, M. K. (2019). Use of an animated emoji scale as a novel tool for anxiety assessment in children. *Journal of Dental Anesthesia and Pain Medicine*, 19(4), 227. <https://doi.org/10.17245/jdapm.2019.19.4.227>
- SHAARI, A. H. (2020). Accentuating Illocutionary Forces: Emoticons as Speech Act Realization Strategies in a Multicultural Online Communication Environment. *3L The Southeast Asian Journal of English Language Studies*, 26(1), 135–155. <https://doi.org/10.17576/3L-2020-2601-10>
- SHAH, R., & TEWARI, R. (2021). Mapping Emoji Usage Among Youth. *Journal of Creative Communications*, 16(1), 113–125. <https://doi.org/10.1177/0973258620982541>
- SHI, L., WANG, Z., QIAN, Z., HUANG, N., PUTEAUX, P., & ZHANG, X. (2019). Distortion Function for Emoji Image Steganography. *Computers, Materials & Continua*, 59(3), 943–953. <https://doi.org/10.32604/cmc.2019.05768>
- SHMUELI, E., SINGH, V. K., LEPRI, B., & PENTLAND, A. (2014). Sensing, Understanding, and Shaping Social Behavior. *IEEE Transactions on Computational Social Systems*, 1(1), 22–34. <https://doi.org/10.1109/TCSS.2014.2307438>
- SICK, J., MONTELEONE, E., PIERGUIDI, L., ARES, G., & SPINELLI, S. (2020). The Meaning of Emoji to Describe Food Experiences in Pre-Adolescents. *Foods*, 9(9), 1307. <https://doi.org/10.3390/foods9091307>
- SIEGEL, R. M., ANNEKEN, A., DUFFY, C., SIMMONS, K., HUDGENS, M., KATE LOCKHART, M., & SHELLY, J. (2015). Emoticon use Increases Plain Milk and Vegetable Purchase in a School Cafeteria without Adversely Affecting Total Milk Purchase. *Clinical Therapeutics*, 37(9), 1938–1943. <https://doi.org/10.1016/j.clinthera.2015.07.016>
- SKOVHOLT, K., GRØNNING, A., & KANKAANRANTA, A. (2014). The Communicative Functions of Emoticons in Workplace E-Mails: :-). *Journal of Computer-Mediated Communication*, 19(4), 780–797. <https://doi.org/10.1111/jcc4.12063>
- SOUCHET, J., & AUBRET, F. (2016). Revisiting the fear of snakes in children: the role of aposematic signalling. *Scientific Reports*, 6(1), 37619. <https://doi.org/10.1038/srep37619>
- STARK, L., & CRAWFORD, K. (2015). The Conservatism of Emoji: Work, Affect, and Communication. *Social Media + Society*, 1(2), 205630511560485. <https://doi.org/10.1177/2056305115604853>
- STEINBERG, M. (2020). LINE as Super App: Platformization in East Asia. *Social Media + Society*, 6(2), 205630512093328. <https://doi.org/10.1177/2056305120933285>
- TANG, M., CHEN, B., ZHAO, X., & ZHAO, L. (2020). Processing network emojis in Chinese sentence context: An ERP study. *Neuroscience Letters*, 722, 134815. <https://doi.org/10.1016/j.neulet.2020.134815>
- TEOH, D., SHAIKH, R., VOGEL, R. I., ZOELLNER, T., KULASINGAM, S., LOU, E., ... BORTOLOZZI, F. (2019). Low coverage of HPV vaccination in the national immunization programme in Brazil : Parental vaccine refusal or barriers in health- service based vaccine delivery ? *Journal of Medical Economics*, 0(1), 1–14. <https://doi.org/10.1080/13696998.2019.1624556>

- THOMPSON, D., MACKENZIE, I. G., LEUTHOLD, H., & FILIK, R. (2016). Emotional responses to irony and emoticons in written language: Evidence from EDA and facial EMG. *Psychophysiology*, 53(7), 1054–1062. <https://doi.org/10.1111/psyp.12642>
- TIAN, X., BATTERHAM, P., SONG, S., YAO, X., & YU, G. (2018). Characterizing Depression Issues on Sina Weibo. *International Journal of Environmental Research and Public Health*, 15(4), 764. <https://doi.org/10.3390/ijerph15040764>
- TRICCO, A. C., LILLIE, E., ZARIN, W., O'BRIEN, K. K., COLQUHOUN, H., LEVAC, D., ... STRAUS, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals of Internal Medicine*, 169(7), 467–473. <https://doi.org/10.7326/M18-0850>
- TROIANO, G., & NANTE, N. (2018). Emoji: What does the scientific literature say about them?—A new way to communicate in the 21st century. *Journal of Human Behavior in the Social Environment*, 28(4), 528–533. <https://doi.org/10.1080/10911359.2018.1437103>
- ULLAH, M. A., MARIUM, S. M., BEGUM, S. A., & DIPAN, N. S. (2020). An algorithm and method for sentiment analysis using the text and emoticon. *ICT Express*, 6(4), 357–360. <https://doi.org/10.1016/j.icte.2020.07.003>
- Unicode. (2010, October 11). Unicode 6.0.0. Retrieved June 1, 2022, from Unicode® 6.0.0 – Released: 2010 October 11 (Announcement) website: <http://www.unicode.org/versions/Unicode6.0.0/>
- URABE, Y., RZEPKA, R., & ARAKI, K. (2021). Find right countenance for your input—Improving automatic emoticon recommendation system with distributed representations. *Information Processing & Management*, 58(1), 102414. <https://doi.org/10.1016/j.ipm.2020.102414>
- VAN DAM, L., RIETSTRA, S., VAN DER DRIFT, E., STAMS, G. J. J. M., VAN DER MEI, R., MAHFOUD, M., ... REID, T. G. (2019). Can an Emoji a Day Keep the Doctor Away? An Explorative Mixed-Methods Feasibility Study to Develop a Self-Help App for Youth With Mental Health Problems. *Frontiers in Psychiatry*, 10. <https://doi.org/10.3389/fpsy.2019.00593>
- VASILJEVIC, M., PECHEY, R., & MARTEAU, T. M. (2015). Making food labels social: The impact of colour of nutritional labels and injunctive norms on perceptions and choice of snack foods. *Appetite*, 91, 56–63. <https://doi.org/10.1016/j.appet.2015.03.034>
- VAUGHN, J., SHAH, N., JONASSAINT, J., HARRIS, N., DOCHERTY, S., & SHAW, R. (2020). User-Centered App Design for Acutely Ill Children and Adolescents. *Journal of Pediatric Oncology Nursing*, 37(6), 359–367. <https://doi.org/10.1177/1043454220938341>
- VELARDO, S., POLLARD, C. M., SHIPMAN, J., & BOOTH, S. (2021). How Do Disadvantaged Children Perceive, Understand and Experience Household Food Insecurity? *International Journal of Environmental Research and Public Health*, 18(8), 4039. <https://doi.org/10.3390/ijerph18084039>
- WAGNER, A., MARUSEK, S., & YU, W. (2020). Sarcasm, the smiling poop, and E-discourse aggressiveness: getting far too emotional with emojis. *Social Semiotics*, 30(3), 305–311. <https://doi.org/10.1080/10350330.2020.1731151>
- WANG, Z., CUI, X., GAO, L., YIN, Q., KE, L., & ZHANG, S. (2016). A hybrid model of sentimental entity recognition on mobile social media. *EURASIP Journal on Wireless Communications and Networking*, 2016(1), 253. <https://doi.org/10.1186/s13638-016-0745-7>

- WEI, L., TSANG, A., WONG, N., & LOK, P. (2020). Kongish Daily : researching translanguaging creativity and subversiveness. *International Journal of Multilingualism*, 17(3), 309–335. <https://doi.org/10.1080/14790718.2020.1766465>
- WEIß, M., GUTZEIT, J., RODRIGUES, J., MUSSEL, P., & HEWIG, J. (2019). Do emojis influence social interactions? Neural and behavioral responses to affective emojis in bargaining situations. *Psychophysiology*, 56(4), e13321. <https://doi.org/10.1111/psyp.13321>
- WEISSMAN, B., & TANNER, D. (2018). A strong wink between verbal and emoji-based irony: How the brain processes ironic emojis during language comprehension. *PLOS ONE*, 13(8), e0201727. <https://doi.org/10.1371/journal.pone.0201727>
- WHO. (1948, April 7). Constitution of the World Health Organization. Retrieved June 1, 2022, from WHO constitution website: <https://www.who.int/about/governance/constitution>
- WHO | World Health Organization. (2015). *WHO compendium of innovative health technologies for low resource settings, 2011-2014: assistive devices, EHealth solutions, medical devices, other technologies, technologies for outbreaks*. Geneva, Switzerland: World Health Organization.
- WICKE, P., & BOLOGNESI, M. (2020). Emoji-based semantic representations for abstract and concrete concepts. *Cognitive Processing*, 21(4), 615–635. <https://doi.org/10.1007/s10339-020-00971-x>
- WU, J., LU, K., SU, S., & WANG, S. (2019). Chinese Micro-Blog Sentiment Analysis Based on Multiple Sentiment Dictionaries and Semantic Rule Sets. *IEEE Access*, 7, 183924–183939. <https://doi.org/10.1109/ACCESS.2019.2960655>
- YUS, F. (2014). Not all emoticons are created equal. *Linguagem Em (Dis) Curso*, 14(3), 511–529. <https://doi.org/10.1590/1982-4017-140304-0414>
- ZUBOFF, S. (2020). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London: Profile Books.