On the Linguistic Status of Emojis

Dennis Reisloh & Tatjana Scheffler

Abstract. This study explores the linguistic potential of emojis, focusing on their grammatical and semiotic qualities. While previous research has examined emojis as language accompaniments, this paper investigates their use in standalone sequences. In two experiments, participants transferred simple German sentences into emoji sequences, to enable analyses into how a) subject-predicate order and b) human versus animal agents affect emoji usage. The results indicate that although emojis can represent simple sentences while assuming basal grammatical features, a systematic use of grammatical concepts cannot be found. Instead, participants often rely on visual characteristics of the emojis rather than abstract linguistic meaning.

1. Introduction

The increase of digital messages deviating from standard linguistic norms has created a necessity for the expansion of graphic sign systems in digital linguistic spaces (Androutsopoulos, 2020). In these medially written, but mostly conceptually oral (cf. Koch and Oesterreicher, 1985), contexts, emojis are used frequently (Androutsopoulos, 2003; Siebenhaar, 2018). While research has examined the language accompanying use of emojis, identifying their linguistic functions (e.g. Dürscheid and Siever, 2017; Pappert, 2017), fewer studies focus on the use of emojis as standalone sequences. This could be due to the fact that emojis are context-sensitive to a large extent (Gawne and McCulloch, 2019). However, recent work by (Weissman, Engelen, Baas, and Cohn, 2023) shows that emojis are undergoing a process of lexicalization, which allows some of them, e.g., object and activity emojis, to be interpreted independently of context. Furthermore, this raises the question of the extent to which emojis have the potential to be used as language-independent

Dennis Reisloh 0009-0006-5187-7947
Ruhr-University Bochum, Germany
Tatjana Scheffler 0000-0001-7498-6202
Ruhr-University Bochum, Germany

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linguistic signals. While emojis have been shown to assume graphematic functions (Dürscheid and Meletis, 2019) and substitute for words or punctuation marks (Scheffler, Brandt, Fuente, and Nenchev, 2022), they are missing complex grammatical structures (Dürscheid and Siever, 2017). For these reasons, emojis could not be classified as independent linguistic elements but rather as elements that accompany language. Nevertheless, the pure use of emoji sequences can still be observed (McCulloch and Gawne, 2018). Building on the framework of Jackendoff and Wittenberg (2014), Cohn, Engelen, and Schilperoord (2019) has established a hierarchy for different grammatical levels of emoji sequences, which shows different possible basic grammatical constructions.

This paper aims to expand on current research, exploring the grammatical and semiotic qualities of object and activity emojis in more detail. For this purpose, we devised an experiment that asks participants to translate standard German sentences into emojis. This allows us to answer the following two research questions, providing deeper insight into the linguistic status of emojis:

1. To what extent does the position of the subject in the given sentence affect the position of the corresponding emoji in the translated sequence?
2. Are emojis depicting people from the subcategory "activities and sports" interpreted in a human context and preferentially selected for this purpose or are they used independently to describe an abstract activity?

Both questions address the emojis' potential as abstract linguistic signals. The first investigates the syntax of emoji sequences (following ibid.), while the second investigates whether activity emojis are still interpreted holistically as depicting scenarios, or whether their meaning has conventionalized and become more detached from a specific scene and actor type.

2. Background

Although the grammar of emojis remains a rarely explored topic in current research, a few studies have examined it from different perspectives. Studies have shown that emojis can be substituted for words or punctuation marks (Cohn, Roijackers, Schaap, and Engelen, 2018; Pappert, 2017; Scheffler, Brandt, Fuente, and Nenchev, 2022). McCulloch and Gawne (2018) argue that emojis are most comparable to words; however, this alone is insufficient to classify them as an independent language, as languages must exhibit grammatical structures. They reject the notion that emojis possess a hierarchical grammar, supporting their claim by analyzing the ten most frequently used bigrams, trigrams, and quadrigrams of emoji sequences. With only one exception, these sequences

predominantly consist of repeated instances of the same emoji. Through corpus analyses, they demonstrate that this pattern contrasts with the English language—even in informal contexts—and argue that emojis do not function with an autonomous grammar. Instead, they behave similarly to rhythmic gestures in relation to written text.

This raises the question of how emojis operate when they are not embedded within written text. Cohn, Engelen, and Schilperoord (2019) have categorized different types of emoji sequences and classified them into four distinct grammatical levels, drawing on the hierarchy proposed by Jackendoff and Wittenberg (2014). This hierarchy not only encompasses complex linguistic systems but also differentiates between possible precursors to fully developed language structures.

The lowest category in this classification consists of *one-unit grammars*, which include sequences of multiple emojis used to create a larger unit or a cohesive image. Following this is the category of *linear grammars*, where emojis are employed as lists of different elements or temporal sequences. The frequent *reduplications* of emojis highlighted by McCulloch and Gawne (2018) are also included in this category. Such repetitions function as intensifiers or as indicators of large quantities, analogous to the repetition of morphemes in various languages (Cohn, Engelen, and Schilperoord, 2019).

Although the model excludes more complex grammatical structures for emojis, the next two categories at least exhibit basic forms of grammar. The *categorical grammars* type includes *two-unit* and *three-unit* emoji sequences, which incorporate grammatical elements such as subject, verb, and object. Notably, in the given examples, the sequence of emojis does not necessarily align with the word order of the corresponding translated sentence. Furthermore, the subject of the sentence is not represented by an emoji but is instead assumed to have an automatic first-person indexicality—an observation frequently made in emoji usage (Grosz, Kaiser, and Pierini, 2021).

As the fourth and highest grammatical level for emojis, Cohn, Engelen, and Schilperoord (2019) introduce *simple phrase grammars*. This category, consisting of only one subcategory, is limited to cases where emoji sequences emerge through the embedding of grouped emojis within other grouped emojis. For instance, the role of the subject may not be conveyed by a single emoji but rather by an *affixation*, i.e., a combination of multiple emojis that together form a larger unit. Beyond the grammatical hierarchy, additional phenomena, such as the use of metonymy and rebus writing, are noted. These findings align with observations made by Weissman, Engelen, Baas, and Cohn (2023) on the presence of polysemy and homonymy in emoji usage.

The research conducted by Weissman, Engelen, Baas, and Cohn (ibid.) and Cohn, Engelen, and Schilperoord (2019) serves as a foundation for the first experiment in our empirical study presented here.

It is worth noting that the German language, in which the experiments were conducted, is particularly well-suited for investigating the syntactic structures of emoji sequences. Unlike English, for example, German has a relatively free word order and is not strictly bound to an S-V-O structure. The verb-second (V2) constraint allows for more flexible sentence constructions, including the possibility of placing the subject at the end of the sentence (O-V-S). This flexibility enables a more precise discussion of the results regarding the extent to which participants adhered to the given syntax of the matrix language, German, or modified it in their emoji sequences.

The second experiment focuses on activity-related emojis. Grosz, Kaiser, and Pierini (2021) have already found that, unlike facial emojis, activity emojis are less influenced by first-person indexicality and instead function as event-denoting free adjuncts that assign an individual as the agent of an action. Our experiment builds on this finding by examining two distinct categories of activity-related emojis: those that depict humans performing an activity and those that represent an object symbolically associated with an activity.

By manipulating predefined sentences in which a human agent is replaced by an animal, we aim to determine whether these two categories of activity-related emojis are used differently. Specifically, the analysis will explore whether human-representing emojis are consistently chosen to signify a human agent performing the action or whether the selection is guided solely by the activity itself, independent of the agent's identity.

3. Empirical Study

Former studies have already made evident that complex matters or grammatical structures cannot be adequately represented through emojis (Cohn, Engelen, and Schilperoord, 2019; Dürscheid and Siever, 2017). Following Chomsky's assumption (1985, p. 4) that grammar serves as a description of the idealized competence of language, it is conceivable that patterns in the use of emojis could emerge, even if only basic grammatical properties are present. Consequently, the following study tests a "translation" of simple sentences into freely chosen emoji sequences by participants.

3.1. Methodology

3.1.1. *Participants*

The study was conducted with 49 people via an online questionnaire. We recruited 49 individuals. No data were collected that would allow direct identification of participants. Of the participants, 46 reported German

as their native language, while three stated they were fluent in German. Regarding gender identity, 31 identified as female, 16 as male, and two as another gender. One participant indicated being under 20 years old, while the age ranges of 20–29 and 30–39 were the most represented with 13 and 17 participants respectively. Additionally, five participants reported being between 40–49 years old, nine between 50–59 years old, and four were either 60 years or older. The highest levels of education achieved were varied: one participant is a (secondary) student, five had completed secondary school ("*Realschulabschluss*"), twelve had completed high school ("*Abitur*"), 17 held a vocational qualification, six had a Bachelor's degree, and eight had earned a Master's degree.

In order to estimate the participants' emoji fluency, we asked them to specify how often they typically use emojis in contexts such as chats or social media on a scale from 1 to 5 (1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = always). The mean score was 4.429 (sd = 0.707), indicating a high frequency of emojis. No participants specified their emoji usage as "never" or "rarely". When asked about the frequency of exclusively using emojis without additional text in messages or posts, the mean score was 2.694 (sd = 0.822). A detailed overview of the demographic data, presented as bar charts, can be found in Appendix A.

3.1.2. *Study Design*

Participants were randomly assigned to one of two questionnaires on the online survey platform SoSci Survey[1]. The link was programmed to randomly assign one of the two questionnaires upon the first access and to ensure that the next participant received the alternate questionnaire. This process is repeated iteratively. Participants were not informed about their random assignment to one of the two groups. Full versions of the questionnaires are available in the appendix of this study. After providing participants with information about the approximate duration of the survey, a recommendation to use a mobile device (due to its built-in emoji keyboard), and collecting the demographic data summarized in 3.1.1, the task was presented as follows (translated into English): "On the following pages, you will see a short sentence displayed on each page. Please use the input field below to represent the sentence using emojis. The number of emojis you use can be greater or smaller than the number of words in the sentence. Create an emoji sequence that, in your opinion, provides the best possible 'translation.' Please use only emojis available on the emoji keyboard of your device and do not use any other symbols."

Subsequently, participants were presented with ten simple sentences per experiment. Each sentence included an open text field for the partic-

1. https://www.soscisurvey.de/

ipants to input their emoji sequences. The 20 sentences used across the two experiments contained a maximum of three sentence constituents and primarily included words that could be represented with emojis from categories known to be easily understood, even out of context (cf. Weissman, Engelen, Baas, and Cohn, 2023). The sentences from both experiments were randomly mixed and displayed individually on each page, serving as filler items for the alternate experiment.

Experiment 1 aimed to investigate whether the position of the subject in the given sentence influenced the position of the corresponding emoji in the resulting sequence. For this purpose, five sentences were constructed with the sentence structure Subject-Predicate-Adverbial (S-P-A) and another five with the structure Subject-Predicate-Object (S-P-O). Additionally, manipulated versions of these sentences were created by inverting the structure to Adverbial-Predicate-Subject (A-P-S) or Object-Predicate-Subject (O-P-S). For instance, group A received the sentence *Die Sonne scheint warm* ('The sun shines warmly'), while group B received its inverted version *Warm scheint die Sonne* ('Warmly shines the sun'). Note that both the default (subject-first) word order and the reverse are equally grammatical in German. The sentence variants were evenly distributed between the two groups so that both group A and group B received five sentences in their original word order and five in the reverse order, minimizing the impact of potential non-measurable factors within a single group.

Experiment 2 examined the semiotic interpretation of human-representing emojis within the subcategory "Activities and Sports" (part of the "People" category[2]). The central research question was whether these emojis are interpreted solely as depicting human actors or whether they can also denote the activity independently of the human agent. Ten simple sentences were constructed in which humans performed activities that could be represented by emojis from the specified subcategory. Each of these sentences had an alternate version in which the human agent was replaced by an animal. As in Experiment 1, both versions were evenly distributed across the two groups, with each group receiving five sentences in their original form and five in their manipulated form. For instance, group A saw the sentence *Die Frau spielt Golf* ('The woman plays golf'), while group B received the sentence *Der Pinguin spielt Golf* ('The penguin plays golf').

It is worth noting that, due to technical constraints, nouns referring to humans were exclusively presented in either female or male forms. The reason is that many human-representing emojis were only recently

2. For further reference, see `https://emojipedia.org/peopleactivities-sports`. Additionally, there is a separate category called "Activity" including representations of sports gear without depicting humans, see `https://emojipedia.org/activity`.

updated to include gender-neutral versions in the Unicode standard, and these are not properly displayed in some browsers[3].

3.1.3. *Data*

The raw data for the analysis is provided by SoSci Survey, which assigns a unique case number to each participant and records all responses as well as the time required to complete the tasks. This file was further processed by filtering incomplete datasets, resulting in 27 datasets from group A and 22 datasets from group B being included in the analysis. Since the demographic composition of the two groups is very similar (see the full data table for details), we consider the difference in group sizes to be negligible.

Key relative frequencies relevant to the experiment were also recorded in the table. It should be noted that SoSci Survey automatically converts responses into text format. To avoid errors, we conducted a pre-test in which we entered all emojis to verify their respective conversion and ensure correct assignment.

For illustrative purposes, selected examples will be presented in 3.2 and 3.3 as emojis rendered using the current operating system iOS 17.4 by Apple. This approach aims to accurately reflect how these emojis are displayed in practice.

The experiment data and analyses are available at the address `https://osf.io/qhgx3/`.

3.2. Results and Discussion 1: Altered Subject Positions

To analyze the response data, we categorized the obtained emoji sequences for each sentence into three result categories:

1. Consistent Subject Position: This category includes all emoji sequences that consist of at least one representation of the subject and one additional sentence constituent, with the subject-representing emoji(s) placed in the same position as the subject in the given sentence.
2. Shifted Subject Position: This category encompasses all emoji sequences that consist of at least one representation of the subject and one additional sentence constituent, but where the subject-representing emoji(s) were placed in a different position than the subject in the given sentence. This includes cases where the sequence reflects an inverted structure compared to the given sentence, as well as sequences where multiple sentence constituent positions do not correspond to the order in the original sentence.

3. See `https://unicode.org/emoji/charts/full-emoji-list.html`

3. Alternative Representation: This category covers all emoji sequences that either represent only a single sentence constituent or do not include any emoji that can be interpreted as representing the subject of the given sentence. This does not necessarily imply that the task instructions were ignored; in some cases, patterns can still be observed for certain sentences.

It is important to note that, across all result categories, not all sequences align with the categorical grammar framework of Cohn, Engelen, and Schilperoord (2019). In many cases, assigning sequences to a specific grammatical structure or distinguishing between patterns is challenging. In the following sections, some of these representations will be further analyzed and interpreted to gain deeper insights into the observed phenomena.

3.2.1. *Subject-Predicate-Adverbial*

After categorizing the responses into the three result categories, the frequency distribution for sentences with the structure S-P-ADV is shown in Figure 1, with the numbering of the sentences corresponding to that in the questionnaire appendix. The addition of "i" denotes the inverted form of the sentence with the structure ADV-P-S.

In this section, the results for these sentences will be presented, highlighting the frequency of emoji sequences that correspond to each of the three categories (consistent subject position, shifted subject position, and alternative representation). This analysis will provide insights into how the participants adapted the sentence structure when translating it into emojis, and whether the inversion of the sentence order affected the placement of the subject-representing emojis.

It is immediately apparent that the subject position is mostly retained with values between 77.8% and 90.9% when it appears at the beginning of the given sentence. In contrast, when the sentence structure is inverted, the subject position is more frequently shifted, with values ranging from 40.7% to 72.7%, although with greater variability in the data. This significant difference between the data from the respective sentences and their inverted variants indicates that participants did not simply adhere to the syntax of the given sentence. Furthermore, it is unlikely that the order within the emoji sequence was chosen entirely arbitrarily; for example, shifting the subject position when it appears at the beginning of the sentence occurs at a frequency of at most 7.4% in Sentence 5, making this a rather exceptional case.

The frequency of alternative representations varies across sentences, ranging from 4.5% to 29.6%. In line with the assertion that performance does not directly reflect competence (Chomsky, 1985, p. 4), it cannot be concluded from the present data that emojis inherently possess the

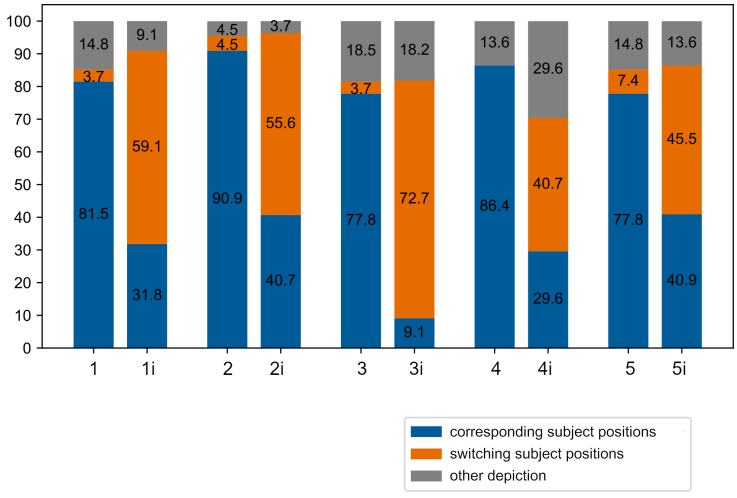


FIG. 1. Results of Experiment 1a: Subject position in emoji sequences for S-P-ADV (unmarked) and ADV-P-S (inverted, indicated by "i") syntax

grammatical property of positioning the subject at the beginning of the sentence. It is also plausible that participants oriented themselves towards the more familiar syntax; after all, starting a main clause with the subject is typical for German.

In the following, we will discuss several examples that illustrate the responses obtained.

(1) *Die Sonne scheint warm.*
'The sun shines warmly.'

a. ☀️🔥 (188/A1*)[4]
b. ☀️🥵 (106/A1*)
c. 👉🌞🌄🌡️ (140/A1)
d. ☀️ (178/A1*)

Emoji sequences like those in (1a) and (1b) were frequently used, while (1c) represents a single exception. A word-for-word "translation" was therefore more likely to be rejected by participants, although it demonstrates that such translations are not impossible. This contradicts the

4. The numbers identify the response in the raw data table described earlier. The first part of the identifier indicates the number for the row in the document. The second part provides the SoSci Survey question identifier, which can be found in the headers of the respective columns. Emoji sequences that appear multiple times in the responses (disregarding any skin tone modifications) are marked with an asterisk.

assumption that a definite article cannot be represented by emojis (Dürscheid and Siever, 2017).

In the inverted version of the sentence, examples (1a) and (1b), or the same sequences in reverse order, were also observed. It is noteworthy that, in addition to representing the subject, emojis were used to depict the adverbial adjective *warm*, with the predicate being entirely omitted. The meaning had to be inferred from the interaction of the two emojis. This tendency can be observed for the other sentences as well.

Alternative representations, such as in (1d), include only a single sun emoji. It is conceivable that such a representation was chosen because the sun inherently has the properties of shining and radiating warmth. Therefore, adhering to grammatical structures may be seen as unnecessary under certain conditions. This aligns with Pappert's (2017) assertion that emojis serve an *economic function*, simplifying communication by reducing the need for complex syntactic constructions.

(2) *Laut singt der Vogel.*
'Loudly sings the bird.'

a.  (120/A2*)

b.  (154/A2)

Larger differences in representation are observed in the results for sentence 2i. The frequent combination of a speaker and musical notes, as seen in (2a), suggests that, unlike in sentence 1, a combination of two emojis (or even one) is insufficient to convey the meaning of the sentence. This could be due to the fact that a sequence like (2b) may capture the semantic features [+bird] and [+loud], but the melodic property of singing is completely omitted—unlike with the sun, where even a single emoji can evoke an associated property like warmth.

This highlights that some actions or properties require a more nuanced representation through emojis, as certain meanings (such as the melody in singing) cannot be captured by basic visual signs. This suggests that the representation of more complex or dynamic concepts may necessitate the use of multiple emojis to fully convey the intended message, as opposed to simpler concepts, which can often be represented with a single emoji.

(3) *Der Vogel singt laut.*
'The bird sings loudly.'
 (82/B2)

The emoji sequence depicted in (3) is the only one where the bird emoji is not congruently positioned at the beginning, following the subject position as in the original sentence. In addition to the repetition of musical notes as a symbol for volume, the microphone can be interpreted as representing the predicate. We argue that this is not merely a

positional shift of the subject based on grammatical properties. Rather, the emojis have been arranged so that the bird directs its gaze toward the microphone, and the musical notes visually originate from the microphone and fly away from the bird.

This raises a challenge in relation to the hierarchy established by Cohn, Engelen, and Schilperoord (2019): Cohn, Engelen, and Schilperoord (ibid.) emphasize that a *one-unit grammar* does not mean a single emoji is used, but rather it can also apply when multiple emojis are used to create a larger *whole image*. In principle, this applies here as well; however, the repetition of the musical note emoji introduces a higher grammatical category within the linear grammar hierarchy. One might assume that by embedding one category within another, the sequence as a whole would be classified as an *embedded sequence*, representing the highest grammatical category. However, a significant difference from the examples of Cohn, Engelen, and Schilperoord (ibid.) lies in the fact that individual sequences are not combined here. While the three musical note emojis represent a *repetition*, they are not combined with a second grammatical form, which consists of the microphone and bird emojis. Instead, the whole image emerges only through the combination of all five emojis.

This suggests that a category above in the hierarchy does not necessarily dominate or subsume a lower category. Additionally, this sequence does not seem to follow higher grammatical structures, and it is likely that no intention to form sentence constituents was present. The idea that such a case, which lacks the recognition of basic grammatical structures, would fall into the same embedded sequencing category as the examples from Cohn, Engelen, and Schilperoord (ibid.), where fundamental grammatical structures are identifiable, seems inadequate to us.

This analysis challenges the application of Cohn et al.'s hierarchical model to more complex and abstract emoji sequences, as the ordering and usage of emojis here suggest a different type of syntactic or visual organization that does not strictly adhere to the basic structures identified in their framework.

(4) *Schnell fährt das Auto.*
'Fast drives the car.'

a.  (104/B3*)

b.  (78/B3*)

Sentence 3i shows the lowest frequency of 9.1% for maintaining the subject position. Emoji sequences such as those shown in (4), represent the largest share of the depiction. The same holds true for sentence 3. Here, as in example (3), it is evident that the sequence is less oriented toward sentence constituents and more toward a pictorial representation, following a *one-unit grammar* (ibid.), in order to form an *affixation*. Once again, the direction of the car and dust cloud emojis plays a significant role. It

can be assumed that if these were presented mirror-reversed in the emoji keyboard, the preferred representation would likely involve an inversion of the sequences in (4).

This would also highlight a feature that continues to distinguish emojis from writing systems of both alphabetic and logographic languages. We suspect that a mirror image of German alphabetic characters would disrupt reading flow at least to some degree and doubt that such a reversal would result in a preference for the syntactic swapping of individual words or morphemes within a sentence.

In contrast to written language, where the inversion of individual characters or words can lead to confusion or difficulty in reading, the flexibility and potential for visual play in emoji sequences do not seem to face the same constraints. Emojis function in a more visual or pictorial domain where spatial and directional manipulations of symbols may not necessarily disrupt comprehension.

(5) *Schnell fährt das Auto.*
'Fast drives the car.'
🏎️ (74/B3*)

(6) *Hoch fliegt das Flugzeug.*
'High flies the airplane.'
✈️ (264/A4*)

Examples (5) and (6), consistent with (1d), show that a single emoji can also be perceived as sufficient when it semantically encompasses all the properties conveyed in the sentence. For example, a race car is attributed the inherent property [+can drive fast], while an airplane is attributed the property [+flies high].

We would also like to argue that the proportion of other representations for sentences 4 and 4i is relatively high due to the use of a single airplane emoji, as the design of the emoji visually emphasizes the direction of flight. This visual cue reinforces the semantic message of the sentence, which may make a single emoji appear adequate to represent the entire meaning. By highlighting specific characteristics such as speed or altitude, the emoji can provide a complete, contextually appropriate "translation" of the sentence, thereby making it a functional representation in the context of emoji-based communication.

3.2.2. *Subject-Predicate-Object*

Following the division into the three result categories, the frequency distribution for sentences with the structure S-P-O is shown in Figure 2, where the sentence numbering corresponds to the one in the questionnaire in the appendix. The suffix "i" represents the inverted form of the sentence with the structure O-P-S.

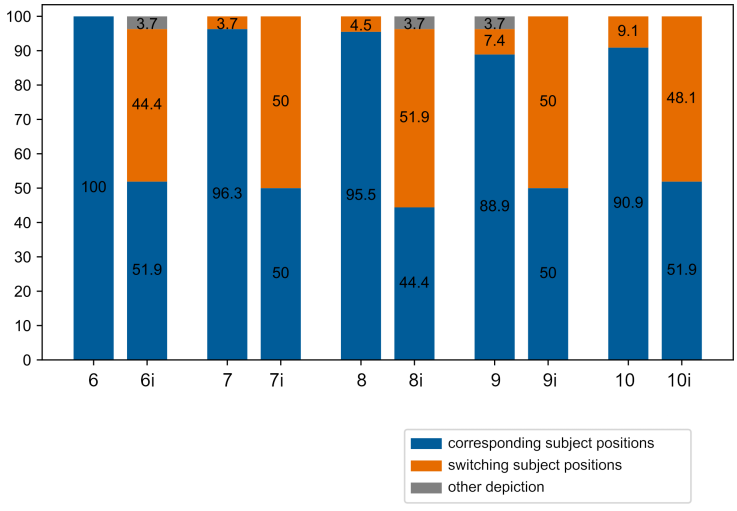


FIG. 2. Results of Experiment 1b: Subject position in emoji sequences for S-P-O (unmarked) and O-P-S (i = inverted) syntax

In comparison with the results from 3.2.1, it is evident that the proportion of other representations, often involving just a single emoji, is significantly lower, with values ranging from 0% to 3.7%. This supports my assumption that these were not chosen arbitrarily or due to ignorance, but rather because the adverbial adjective describes an inherent property of the subject and does not necessarily require its own representation. However, for sentences with an object, it seems necessary to provide an explicit representation of the object. It is observed that the alignment of the subject position, on average, exceeds 90% when the subject is at the beginning of the sentence, indicating that there is neither significant rejection nor arbitrary changes in this case. For sentences where the subject is at the end of the sentence, there is nearly a 50%-50% ratio on average when it comes to maintaining the subject position, with only minor variability. This initially suggests that there is no consensus on a fixed rule. However, an analysis of selected examples in 3.2.1 showed that the syntax does not necessarily depend on the order of the sentence components. Rather, the direction of representation of certain emojis, such as in examples (3) or (4), seems to have a significant influence on the participants' choices.

(7) *Die Hummel liebt Blumen.*
'The bumblebee loves flowers.'
a. 🐝❤️🌹🌷🌸 (228/A9)
b. 🐝🥰🌸🏵️🌻🌼 (162/A9)

The fact that the direction of emojis is not a sufficient factor in determining sentence syntax is demonstrated by examples (7). In these cases, the bee emoji explicitly looks away from the flower emojis, yet 88.9% of participants chose a syntactically comparable representation. It is also notable that for the word *flowers*, in most cases, a *semantic list* (Cohn, Engelen, and Schilperoord, 2019) was created, which was embedded into the syntactic structure of the sentence. This highlights both the plural and the playful component of the selection of flower emojis, whichPappert (2017) refers to as a *ludic function*. A bee emoji facing the flower emojis could be congruent with the syntax in sentence 9i. However, 50% of participants chose against this and created a sequence comparable to those in (7). This value is similar to the other sentences 6–10, even though no emoji was chosen that is oriented to the left or right.

We would like to propose the hypothesis that the direction of an emoji is particularly important when an affixation like in (4) is formed, but less so when a whole image is created. This could be tested in future experiments.

(8) *Der Weihnachtsmann liest ein Buch.*
'Santa Claus reads a book.'

a. 🎅📖 (74/B8*)

b. 📖👀🎅 (254/B8)

Here, the emoji sequence in (8a) exemplifies the most frequently chosen representation of the sentence (68.2%, regardless of skin tone modification). Compared to (8b), the only instance in which the subject's position was swapped, the representation of the predicate is omitted. This may be related to the fact that an open-book emoji intuitively associates with reading, and also that the eye emoji directs its gaze to the left. To avoid ambiguity, the subject position would need to be swapped, which is less preferred. In sentence 8i, a representation with the eye emoji while maintaining the subject position appears only 14.8% of the time, suggesting that economy, driven by semantic properties, likely has a stronger influence on the responses.

(9) *Das Baby malt einen Regenbogen.*
'The baby paints a rainbow.'

a. 👶🖌️🌈 (232/B10*)

b. 👶🖍️🌈 (230/B10*)

c. 👶🎨🌈 (216/B10*)

The various examples for sentence 10 show an orientation toward the syntactic structure of S-P-O. In only 9.1% of the cases, a representation of the predicate was omitted. It is assumed that a rainbow does not have the prototypical property of being painted, which makes a representation

smaller than a *three-unit sequence* (Cohn, Engelen, and Schilperoord, 2019) less preferable for reasons of economy.

In conclusion, it can be stated that, in the context of the experiment, emoji sequences appeared at all levels of the hierarchy established by Cohn, Engelen, and Schilperoord (ibid.). A preference based on sentence structure could not be demonstrated. Rather, specific properties, such as gaze direction and prototypical associations, seem to be decisive for the "translation" of the sentence. Considering the guidelines given for future emojis, the establishment of emojis as an independent language seems highly unlikely and currently unattainable. However, their use as lexical units is possible, as argued by Dürscheid and Siever (2017) and Weissman, Engelen, Baas, and Cohn (2023), among others. In response to the initial research question, we can conclude that a subject position at the beginning of the emoji sequence is preferred when it aligns with the subject position in the given sentence. When the subject is at the end of the sentence, no clear preference is observed for the subject's position within the response. Maintaining and shifting the position of the subject-representing emoji are equally preferred or rejected on average. Some emoji sequences exist at a lower grammatical level, which does not follow the formation of sentence constituents. The semiotic qualities of the emojis also influence the order within a sequence. We therefore assume that emojis provide incentives to forgo strictly fixed grammatical structures.

3.3. Results and Discussion of Exp. 2: Semiotics of Activity Emojis

As already shown in the examples from 3.2, the semiotic quality of emojis is not easily determined. Examples (1d), (5), and (6) demonstrate that an emoji can represent not only individual concepts of entities but also entire propositions, although this may not necessarily be the preferred application. For activity emojis depicting people (hereafter abbreviated as HAEs), it is conceivable that these can represent an entire proposition or only the activity itself. It is also important to examine whether this changes in different contexts, thus suggesting that a semiotic association (in the sense of Saussure, 2011) juncts to represent an activity (Grosz, Kaiser, and Pierini, 2021); however, no distinction is made between HAEs and emojis from the separate category of "activities" that do not depict people. The results of this study can build upon these findings.

For the analysis of the response data, we have divided them into the following result categories:

1. Subject Representation + Human Activity Emoji: This category includes all emoji sequences that, in addition to an HAE, contain at least one other emoji representing the agent of the sentence.

2. Subject Representation + Other Representation of Activity: This includes all emoji sequences that feature at least one emoji representing the agent (hereafter abbreviated as AR) and at least one other emoji depicting the activity, without using an HAE.
3. Only Human Activity Emoji: This category, which only appears in 3.3.1, includes emoji sequences consisting solely of a single HAE or its repetition.
4. Other Representation: Emoji sequences that do not include an HAE and either lack a representation of the agent or the activity are categorized here.

Occasionally, there were responses that did not adhere to the task and included additional characters alongside emojis. These are categorized as "not adhering to the task" and are included in the graphs in 3.3.1 and 3.3.2.

3.3.1. *Humans as Agents*

Based on the classification into the previously mentioned result categories, the frequency distribution for sentence variants with a human agent is shown in Figure 3, with the sentence numbering corresponding to the questionnaire in the appendix.

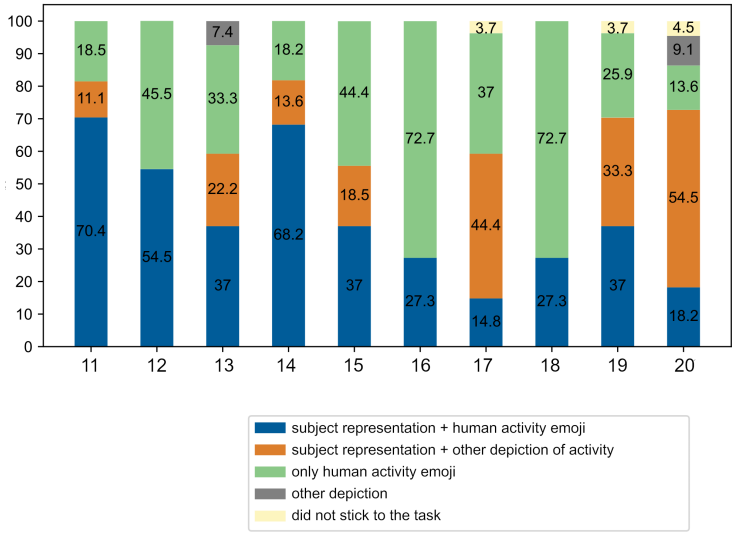


FIG. 3. Results of Experiment 2a: Usage of human representing activity emojis in sentences with human agents

Significant deviations in the frequencies of the first three result categories are observed. The frequency of an emoji sequence with AR (Agent Representation) combined with at least one HAE (Human Activity Emoji) averages 39.2%, with a considerable spread ranging from 14.8% to 70.4%. A comparable average is observed for the representation using only HAE, at 38.2%, although this category exhibits an even larger spread, with values ranging from 13.6% to 72.7%. A lower average of 19.8% is found for emoji sequences with AR combined with a representation of the activity without HAE, with values ranging from 0 to 54.5%. Other result categories appear only rarely, with a maximum value of 9.1% for sentence 10. Notably, despite the significant spread in the values, certain pairs exhibit very similar frequency distributions, such as sentences 11 and 14, sentences 13 and 15, and sentences 16 and 18. We will now discuss in the following examples whether patterns can be identified that point to underlying reasons for these results.

(10) *Peter schwimmt.*
'Peter swims.'
a. 🏊 (74/B16*)
b. 👨🏊 (160/B16)

The most common representation of sentence 16 is shown in (10a). The chosen HAE depicts a male person, interpreted as *Peter*, wearing a swim cap and goggles, engaged in a swimming motion in the water. Less frequent representations, such as in (10b), place an emoji before the HAE, which could be interpreted as indicating gender or suggesting that the person depicted is not arbitrary. An identical distribution of responses based on the selected result categories is also found in the following sentence:

(11) *Laura tanzt.*
'Laura dances.'
a. 💃 (258/B18*)
b. 👩💃 (70/B18)

The HAE chosen in (11a) depicts a female person, interpreted as *Laura*, wearing a flowing dress and adopting a dancing posture. Less frequent emoji sequences with a preceding AR also appear, which might indicate gender or a specified name. Sentences 16 and 18 share a distinctive feature compared to all other sentences: both consist solely of a subject and predicate, each represented by a single word. The highest response rate with exclusive HAE representation, 72.7%, in sentences 16 and 18 correlates with this structure.

(12) *Die Frau jongliert.*
'The woman juggles.'

a. 👩🤹 (78/B12*)
b. 🤹 (216/B12*)

While the representation of sentence 12 through a combination of AR and HAE, as seen in (12a), is preferred with a frequency of 55%, the representation through a single HAE, at 45%, is similarly common. Since the juggler emoji marks the feminine attribute primarily through the hair partially covered by the hat—unlike the dancer emoji in (11)—this might explain the slightly higher rate of the additional AR. It is also worth noting that there are no responses to sentences 12, 16, and 18 without an HAE.

(13) *Die Frau fährt Ski.*
'The woman skis.'
a. 👩⛷ (104/B14*)
b. ⛷ (236/B14*)
c. 👩🎿 (222/B14*)

Sentence 14 contains the same subject as sentence 12 and shows similar results, but with a significantly differing frequency distribution. The representation with a single HAE, as seen in (13b), is only present in 18.2% of cases, while emoji sequences consisting of both AR and HAE are present in 68.2%. Another representation of the activity using the ski equipment emoji is also relatively rare, at 13.6%. This suggests that an HAE is used to represent the activity itself, and additional AR is only necessary when certain properties, such as gender, are not identifiable in the HAE. The ski HAE in (13a) and (13b), unlike the previously discussed HAEs, is not available in multiple gender-marked variants in Unicode, which may explain the high rate of emoji sequences as in (13a).

At this point, we would like to reject the previously made assumption that an AR placed before the HAE functions to distinguish between specific and unspecified entities. While *Peter* and *Laura* in sentences 16 and 18 are more specific than *the woman* in sentences 12 and 14, a preceding AR occurs significantly more often in sentences 12 and 14, suggesting it can be interpreted more as a gender marker.

(14) *Leon und Florian halten Händchen.*
'Leon and Florian hold hands.'
a. 👫 (84/A17*)
b. 👦🤝👦 (180/A17*)
c. 🧑🤝🌷 (246/A17)

Sentence 17 exhibits a unique frequency distribution of result categories. While 37% of the emoji sequences are represented by a single HAE as in (14a), only 14.8% consist of a combination of HAE and AR. The largest proportion, 44.4%, consists of a combination of emojis representing the

agent and a representation of the activity without HAE, as seen in (14b) and (14c). It is difficult to clearly identify the reasons for this. Representations similar to (14b) for ”Leon” and ”Florian” always feature the same emoji, which excludes a more precise differentiation of the individuals through distinct heads. Perhaps the depiction of multiple people within one emoji also leads to this being less recognized and therefore less frequently chosen. Example (14c) forms an interesting exception, where the names are presented playfully: the lion emoji for ”Leo” and the tulip emoji for ”Florian”, likely referencing the word ”Flora.” This is an example of wordplay, as addressed by Gawne and McCulloch (2019), the meaning of which can be difficult, if not impossible, to disambiguate without context.

In general, it is noticeable that the depiction of specific names posed problems. The appearance of sequences like (14c) shows that participants did not consider this aspect irrelevant. For sentences 17, 19, and 20, there are even occasional responses in which the task was ignored, and names were written out without emojis. This illustrates that not only can complex concepts not be adequately expressed with emojis (Dürscheid and Siever, 2017), but even very simple yet specific ideas cannot always be properly conveyed. Therefore, the experiment, as already mentioned, adapted the sentences mostly to the available visual vocabulary (Cohn, Engelen, and Schilperoord, 2019) of emojis.

3.3.2. *Animals as Agents*

In order to assess the semiotic qualities of HAEs, it is essential to first examine and discuss the results of their use in a context without human agents. To confirm the hypothesis that HAEs can denote activity independently of a human context, it would be expected that these appear with similar frequency in the manipulated sentence variants 11t to 20t. For sentence variants with animal agents, the frequency distribution shown in Figure 4 applies, with the sentence numbering matching that in the questionnaire in the appendix. The suffix “t” marks that these are the manipulated versions of the sentences without the addition, in which the agent has been replaced by an animal.

Even when humans are replaced by animals as agents, no consistent pattern emerges regarding the form of representation. Combinations of AR and HAE are used with great variation, ranging from 14.8% to 88.9%, while combinations of AR and representation of the activity without HAE occur with frequencies ranging from 11.1% to 95.5%. A representation consisting solely of HAE does not occur at all. This observation is consistent with the earlier conclusion that an emoji is considered necessary as an additional AR if it expresses important properties that are not made visible by the HAE.

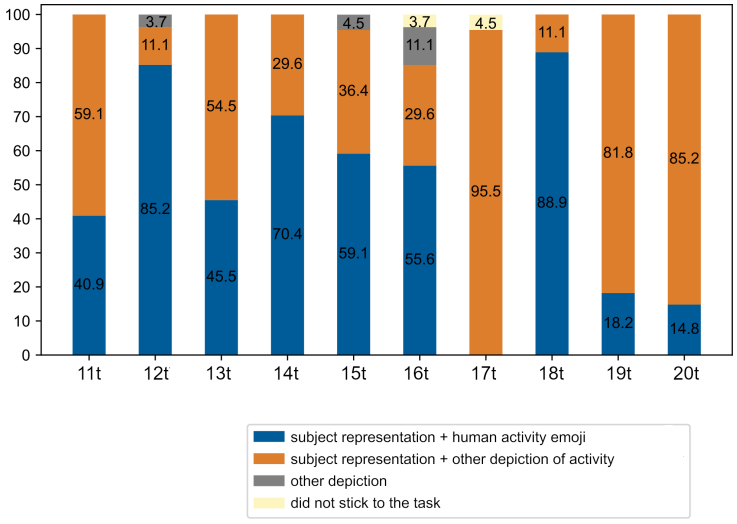


FIG. 4. Results of Experiment 2b: Usage of human representing activity emojis in sentences with animal agents

Unlike the variants with human context, similar correlations of frequency distributions between the sentences 11t and 14t, 13t and 15t, and 16t and 18t cannot be observed. According to my assumption that the correlation between the values of sentences 16 and 18 is due to these sentences being the only ones consisting of just two words, it explains why this correlation is absent in sentences 16t and 18t. However, with animals as agents, similar frequency distributions can be found in sentence pairs 11t and 13t, 12t and 18t, as well as 19t and 20t. A more detailed examination of individual representations follows.

(15) *Der Affe jongliert.*
'The monkey juggles.'
a. 🐒🤹 (204/A12*)
b. 🦍🎳 (124/A12)

Example (15a) shows the most frequently given response. Here, the monkey emoji is used as an AR combined with the HAE of the juggling person, which was also used in sentence 12. A plausible assumption is that the HAE is lexically located as a sign for *juggling*, independent of the human characteristic. In contrast, emoji sequences consisting of AR and representation of the activity without HAE, such as in (15b), were used only 11.1% of the time, and present a greater challenge for disambiguation: without context, it is unlikely that this sequence could be traced back to the provided sentence.

(16) *Der Bär tanzt.*
'The bear dances.'
a.  (144/A18)
b.  (218/A18)
c.  (184/A18)

Sentence 18t, with a frequency distribution similar to that of sentence 12t, shows the same pattern with the frequent responses seen in (16a) and (16b): the bear as AR and the dancing people as HAE. The fact that both male and female HAEs occur (and, unlike the juggling person, there is no gender-neutral emoji for this) supports the assumption that the HAE is lexically located for performing the activity. No correlation can be observed between the perceived gender of the dance emoji and the gender provided by the participant who used the emoji in their response. This also reflects the results of Grosz, Kaiser, and Pierini (2021), who view activity emojis as free adjuncts, unlike face emojis, which are not primarily used for referencing the self. Among the less frequent responses (11.1%) is (16c). Here, similar to (15b), a context-sensitive visual puzzle is created, where it is assumed that disambiguation is made more difficult.

(17) *Das Känguru spielt Basketball.*
'The kangaroo plays basketball.'
a.  (160/B19*)
b.  (71/B19*)

A significantly different frequency distribution can be observed in sentence 19t. Emoji sequences consisting of AR and HAE, as shown in (17a), make up only 18.2% of the responses. The variant, preferred with 81.2%, consisting of AR and representation of the activity without HAE, is shown in (17b), the most frequent response. Since this distribution is not an exception, the question arises as to why the use of the HAE is more often avoided. One possible reason we see is that the representation in (17b) does not, like in (15b) or (16c), lead to difficult disambiguation. We suspect that the prototypical association with a basketball is playing, whereas the ballet shoes depicted in (16c), as clothing, first make one think of putting them on or wearing them. And although pins are frequently used with balls for juggling, the ball in the bowling emoji in (15b) more strongly evokes the association with bowling. For sentence 19t, it could even be argued that the use of the HAE in (17a) leads to more difficulty in disambiguating, as a joint game involving a kangaroo and a human could be interpreted. The high rate of HAE in individual sentences in the animal context may therefore not be due to a semiotic connection between the HAE and the activity, but rather a lack of alternative available emojis. However, this also suggests an attempt to use

emojis as lexical units and to avoid constructing picture puzzles that are more difficult to disambiguate.

(18) *Die Katze fährt Boot.*
'The cat goes boating.'
a.  (178/A20*)
b.  (204/A20)
c.  (144/A20)

The responses to sentence 20t paint a picture similar to that of sentence 19t: The representation with 14.8% preference, consisting of AR and HAE, as shown in (18a), suggests that disambiguation is made more difficult. A cat riding a boat is not a typical event; thus, the HAE in (18a) can also be interpreted as a human riding away from the cat in the boat. This assumption is reinforced by the interpretation of other responses: Unlike the responses for most of the other sentences, many participants seemed to feel that a representation with just two emojis, as shown in (18b), was not sufficient. Various emoji sequences, exemplified in (18c), contain a third emoji to connect the cat and boat emojis, as this is presumably necessary to express the relationship between "cat" and "boat."

(19) *Der Hase fährt Ski.*
'The rabbit skis.'
a.  (158/A14*)
b.  (106/A14*)

A frequency distribution with values of 70.4% for the combination of AR and HAE and 29.6% for the combination of AR and a representation of the activity without HAE is observed for sentence 14t. It can be argued that the emoji sequences shown in (19) have a similar degree of difficulty in their disambiguation. While the HAE in relation to the rabbit emoji can be interpreted as an activity performed by the rabbit, an interpretation is also possible where a human skier is approaching the rabbit. Similarly, a prototypical association with the ski equipment could be that the rabbit is merely wearing it or is depicted as moving away from it due to the direction of its gaze. In this case, a preferred representation could be due to individual aesthetic reasons. The most frequent answers for sentences 15t and 16t show a similar pattern. Here too, a representation with HAE is more commonly seen, but a significant portion, 36.4% and 29.6%, respectively, of answers use AR and non-HAE to represent the activity. Answers from both result categories seem equally plausible (see the full data as referenced in 3.1.3), and the exact reasons for the preference can also be attributed to immeasurable factors.

In conclusion, it can be stated that HAEs are frequently used both in animal and human contexts. When characteristics such as gender

marked by a word are visually represented by an HAE, it is seen as unnecessary to form an emoji sequence with an additional AR. In the case of animals as the agent of the sentence, the frequency of HAE usage varies depending on the alternative emojis available. There are cases where an HAE either complicates, simplifies, or likely reflects individual preference for non-measurable reasons. Arguments for considering emojis as an independent language based on *langue* and *parole* (Arafah and Hasyim, 2019; Duque, 2018) therefore seem inadequate and linguistically unsustainable. Regarding the initial question about HAEs, we conclude the following: Clearly defined semiotic relations for HAEs in human contexts can be assumed initially, but when the human characteristic of the agent changes, they can no longer be clearly proven. The individual visual properties of the HAE, as well as prototypical associations between agent and activity, influence the representation of emoji sequences.

3.4. Limitations

Limitations arise from the nature of the study. It must be considered that the results of such an experimental, anonymous online study cannot provide sufficient evidence for generalizable rules regarding the use of emojis. A larger sample size or deliberately selected groups, sorting participants by age, gender, or other demographic data, may yield different results. Due to the anonymous online format, it cannot be ruled out that an individual may have participated multiple times. The interpretation of the results is not always clear-cut, and the reasons for the use of certain emojis and their order in the sequence may vary individually due to immeasurable factors. In contrast to ASCII symbols like emoticons, emojis are not arbitrarily composed products of multiple characters (cf. Pavalanathan and Eisenstein, 2016), but rather individual characters that are firmly embedded in the operating system. Since 2010, they have been encoded in the international character standard Unicode. The representation varies depending on the chosen software, analogous to the use of different fonts, in which the fundamental characteristics of an emoji are maintained so that it can be as easily recognizable as possible. However, it cannot be ruled out that the platform-specific display of individual emojis might be a small but not entirely negligible factor in their disambiguation and, thus, in their usage. It is also assumed that not all participants are familiar with all emojis. Since Unicode provides a four-digit number of emojis on the keyboard, unexpected or shorter sequences may arise for motivational or time-related reasons. Finally, it should be noted that a different selection of sentences could potentially produce different results. Further experiments of this kind are necessary for verification.

4. Conclusion

The aim of this work was to investigate the current linguistic status of emojis. Specifically, we investigated their grammatical and semiotic qualities. Cohn, Engelen, and Schilperoord (2019) established a hierarchy of grammatical complexity for emoji sequences, which shows that basic grammatical constructions are possible. Recent research by Weissman, Engelen, Baas, and Cohn (2023) further indicates that emojis are currently undergoing a lexicalization process, correlating with their category, making context-independent disambiguation more difficult to almost impossible. The empirical study we conducted followed up on this research and asked participants to convert given simple sentences into emoji sequences using free text input in randomized order. Two research questions with ten sentences each were examined. A random assignment into two groups with manipulated sentence variants produced measurable results.

Experiment 1 investigated how the subject position in the given verbal sentence affects the position of the subject-representing emoji in the emoji sequence. The results showed that the subject position is largely preserved when the subject is at the beginning of the sentence (canonical subject-predicate order). When the subject is placed at the end of the sentence (inverse predicate subject order), participants deviate from the structure as often as they adhere to it. The variability between the results of individual sentences is small. The hypothesis that emojis already follow established grammatical structures is therefore unlikely. Additionally, many emoji responses did not adhere to the hierarchical construction of phrases but formed sequences that can be classified at a lower grammatical level. Visual factors such as the direction of an emoji's gaze influenced its position within the sequence. Prototypical associations with the entity represented by the emojis also influenced the decision about whether an (additional) emoji was necessary to represent a word from the original sentence. A notably frequent occurrence was the lack of a separate representation of the predicate.

Experiment 2 examined the semiotic qualities of human-representing activity emojis (HAE). The results primarily found a preferred selection of HAE in the human context. When the agent is assigned an important characteristic, such as gender, which is not visually represented by the HAE, participants added additional emojis to represent the agent. When the agent is replaced by an animal, the frequency distribution of emoji sequence types deviates from those of the sentence variants with a human agent. The use of HAE is rejected when an alternative representation of the activity (e.g., a salient object) leads to less difficulty in disambiguating the sequence. Again, individual visual properties of emojis, as well as prototypical associations with the entities they represent, have an influence.

Our results show that while it is possible to represent simple sentence meanings purely with emojis, these representations show little structure and systematicity, and are often either dependent on the underlying (textual) sentence before translation, or mere depictions of the described situation. Importantly, visual characteristics of the emoji characters, such as their spatial orientation and whether certain properties are visually salient or not, are sometimes more significant for emojis' use in our participants' translations than any abstract 'meaning' assigned to them via their official names. It thus seems that the majority of our participants select (object and activity) emojis not as a 'writing system' for linguistic output (even when asked to do so in an experiment), but rather via distinct processes.

References

Ai, Wei et al. (2017). "Untangling Emoji Popularity Through Semantic Embeddings". In: *Proceedings of the International AAAI Conference on Web and Social Media* 11.1, pp. 2–11.

Androutsopoulos, Jannis (2003). "Online-Gemeinschaften und Sprachvariation. Soziolinguistische Perspektiven auf Sprache im Internet". In: *Zeitschrift für germanistische Linguistik* 31, pp. 173–197.

———— (2020). "Digitalisierung und soziolinguistischer Wandel". In: *Deutsch in Sozialen Medien. Interaktiv—multimodal—vielfältig*. Ed. by Konstanze Marx, Henning Lobin, and Axel Schmidt. Berlin, Boston: De Gruyter, pp. 75–94.

Arafah, Burhanuddin and Muhammad Hasyim (2019). "The Language of Emoji in Social Media". In: *KnE Social Sciences, The 2nd Annual International Conference on Language and Literature (AICLL 2019)*, pp. 494–504.

Chomsky, Noam (1985). *Aspects of the Theory of Syntax*. [original work published 1965]. Cambridge, Massachusetts: The M.I.T. Press.

Cohn, Neil, Jan Engelen, and Joost Schilperoord (2019). "The grammar of emoji? Constraints on communicative pictorial sequencing". In: *Cognitive Research: Principles and Implications* 4, Article 33: 1–18.

Cohn, Neil et al. (2018). "Are emoji a poor substitute for words? Sentence processing with emoji substitutions". In: *Proceedings of the 40th Annual Conference of the Cognitive Science Society*, pp. 1524–1529.

Duque, Diana (2018). "I heart [emoji]: Understanding the effects of a new language of self-expression". In: *PLOT(S) Journal of Design Studies* 5, pp. 54–66.

Dürscheid, Christa and Dimitrios Meletis (2019). "Emojis: A Grapholinguistic Approach". In: *Proceedings of Graphemics in the 21st Century, Brest 2018*. Ed. by Yannis Haralambous. Brest: Fluxus Editions, pp. 167–183. DOI: https://doi.org/10.36824/2018-graf-duer.

Dürscheid, Christa and Christina M. Siever (2017). "Jenseits des Alphabets—Kommunikation mit Emojis". In: *Zeitschrift für germanistische Linguistik* 45.2, pp. 256–285.

Gawne, Lauren and Gretchen McCulloch (2019). "Emoji as Digital Gestures". In: *language@internet* 17, Article 2.

Grosz, Patrick G., Elsi Kaiser, and Francesco Pierini (2021). "Discourse anaphoricity and first-person indexicality in emoji resolution". In: *Proceedings of Sinn und Bedeutung 25*, pp. 340–357.

Jackendoff, Ray and Eva Wittenberg (2014). "What you can say without syntax: A hierarchy of grammatical complexity". In: *Measuring linguistic complexity*. Ed. by Frederick J. Newmeyer and Laurel B. Preston. Oxford: Oxford University Press, pp. 65–82.

Koch, Peter and Wulf Oesterreicher (1985). "Sprache der Nähe—Sprache der Distanz. Mündlichkeit und Schriftlichkeit im Spannungsfeld von Sprachtheorie und Sprachgeschichte". In: *Romanistisches Jahrbuch* 36, pp. 15–43.

Li, Li and Yue Yang (2018). "Pragmatic functions of emoji in internet-based communication—a corpus-based study". In: *Asian-Pacific Journal of Second and Foreign Language Education* 3, Article 16.

McCulloch, Gretchen and Lauren Gawne (2018). "Emoji Grammar as Beat Gestures". In: *Proceedings of the 1st International Workshop on Emoji Understanding and Applications in Social Media (Emoji 2018)*.

Pappert, Steffen (2017). "Zu kommunikativen Funktionen von Emojis in der WhatsApp-Kommunikation". In: *Empirische Erforschung internetbasierter Kommunikation*. Ed. by Michael Beißwenger. Berlin, Boston: De Gruyter, pp. 175–211.

Pavalanathan, Umashanthi and Jacob Eisenstein (2016). "More emojis, less :) The competition for paralinguistic function in microblog writing". In: *First Monday* 21.11.

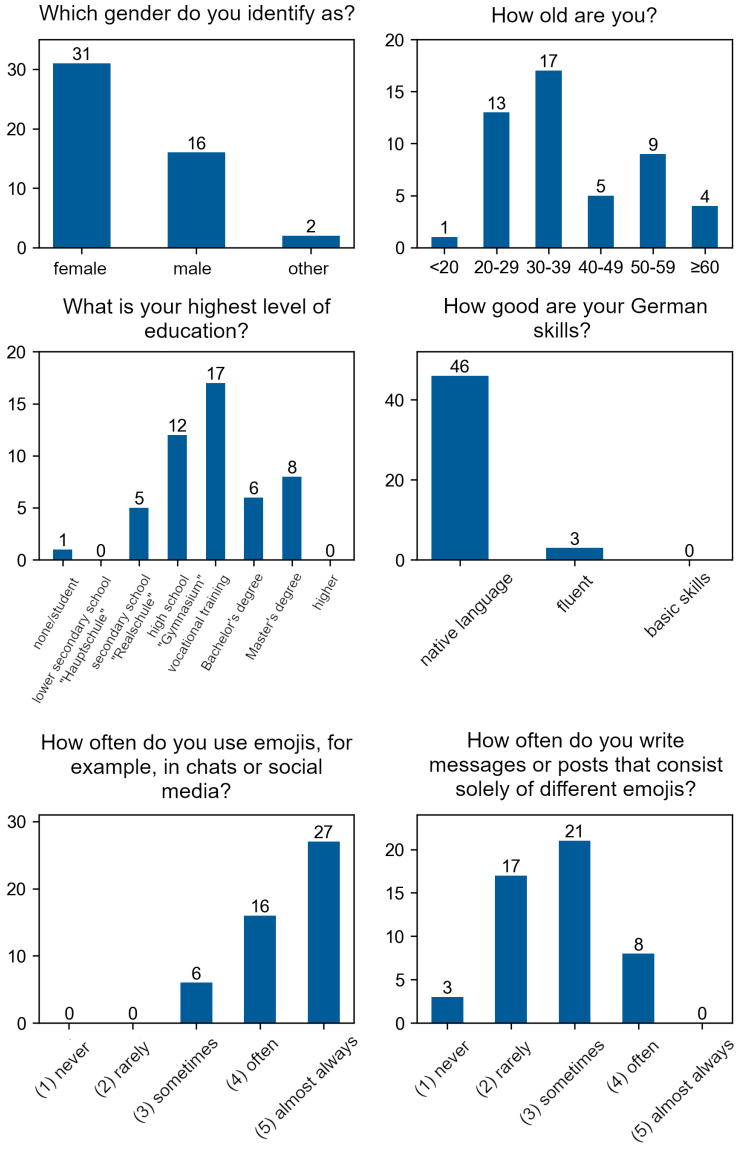
Saussure, Ferdinand de (2011). *Grundfragen der allgemeinen Sprachwissenschaft*. Ed. by Charles Bally and Albert Sechehaye. [Original work published 1916]. Berlin, Boston: De Gruyter, pp. 70–75.

Scheffler, Tatjana et al. (2022). "The processing of emoji-word substitutions: a self-paced-reading study". In: *Computers in Human Behavior* 127, p. 107076.

Siebenhaar, Beat (2018). "Funktionen von Emojis und Altersabhängigkeit ihres Gebrauchs in der Whatsapp-Kommunikation". In: *Jugendsprachen/Youth Languages: Aktuelle Perspektiven internationaler Forschung/Current Perspectives of International Research*. Ed. by Arne Ziegler. De Gruyter, pp. 749–772. URL: https://doi.org/10.1515/9783110472226-034.

Weissman, Benjamin et al. (2023). "The lexicon of Emoji? Conventionality modulates processing of emoji". In: *Cognitive Science* 47.4, e13275. ISSN: 1551-6709. DOI: 10.1111/cogs.13275.

A. Demographic Information of Participants



B. Experiment 1: Items

ID	Syntax	Sentence	Group	SoSci
1	S-P-ADV	Die Sonne scheint warm.	A	A1
1i	ADV-P-S	Warm scheint die Sonne.	B	B1
		'The sun shines warmly.'		
2	S-P-ADV	Der Vogel singt laut.	B	B2
2i	ADV-P-S	Laut singt der Vogel.	A	A2
		'The bird sings loudly.'		
3	S-P-ADV	Das Auto fährt schnell.	A	A3
3i	ADV-P-S	Schnell fährt das Auto.	B	B3
		'The car drives fast.'		
4	S-P-ADV	Das Flugzeug fliegt hoch.	B	B4
4i	ADV-P-S	Hoch fliegt das Flugzeug.	A	A4
		'The plane flies high.'		
5	S-P-ADV	Die Ampel leuchtet grün.	A	A5
5i	ADV-P-S	Grün leuchtet die Ampel.	B	B5
		'The traffic light shows green.'		
6	S-P-O	Der Lehrer spielt Fußball.	B	B6
6i	O-P-S	Fußball spielt der Lehrer.	A	A6
		'The teacher plays soccer.'		
7	S-P-O	Die Königin isst Sushi.	A	A7
7i	O-P-S	Sushi isst die Königin.	B	B7
		'The queen eats sushi.'		
8	S-P-O	Der Weihnachtsmann liest ein Buch.	B	B8
8i	O-P-S	Ein Buch liest der Weihnachtsmann.	A	A8
		'Santa reads a book.'		
9	S-P-O	Die Hummel liebt Blumen.	A	A9
9i	O-P-S	Blumen liebt die Hummel.	B	B9
		'The bumblebee likes flowers.'		
10	S-P-O	Das Baby malt einen Regenbogen.	B	B10
10i	O-P-S	Einen Regenbogen malt das Baby.	A	A10
		'The baby paints a rainbow.'		

C. Experiment 2: Items

ID	Agent	Sentence	Grp	SoSci
11	human	Der Mann liegt im Bett.	A	A11
11t	animal	Der Hund liegt im Bett.	B	B11
		'The man/dog lies in bed.'		
12	human	Die Frau jongliert.	B	B12
12t	animal	Der Affe jongliert.	A	A12
		'The woman/monkey juggles.'		
13	human	Der Mann fährt Fahrrad.	A	A13
13t	animal	Das Eichhörnchen fährt Fahrrad.	B	B13
		'The man/squirrel rides a bicycle.'		
14	human	Die Frau fährt Ski.	B	B14
14t	animal	Der Hase fährt Ski.	A	A14
		'The woman/bunny skis.'		
15	human	Die Frau spielt Golf.	A	A15
15t	animal	Der Pinguin spielt Golf.	B	B15
		'The woman/penguin plays golf.'		
16	human	Peter schwimmt.	B	B16
16t	animal	Der Fisch schwimmt.	A	A16
		'Peter/The fish swims.'		
17	human	Leon und Florian halten Händchen.	A	A17
17t	animal	Die Otter halten Händchen.	B	B17
		'Leon and Florian/The otters hold hands.'		
18	human	Laura tanzt.	B	B18
18t	animal	Der Bär tanzt.	A	A18
		'Laura/The bear dances.'		
19	human	Mehmet spielt Basketball.	A	A19
19t	animal	Das Känguru spielt Basketball.	B	B19
		'Mehmet/The kangaroo plays basketball.'		
20	human	Aylin fährt Boot.	B	B20
20t	animal	Die Katze fährt Boot.	A	A20
		'Aylin/The cat rides in a boat.'		