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Discourse anaphoricity vs. perspective sensitivity in emoji semantics

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This paper aims to provide a foundation for studying the interplay between emoji and linguistic (natural language) expressions; it does so by proposing a formal semantic classification of emoji-text combinations, focusing on two core sets of emoji: face emoji and activity emoji. Based on different data sources (introspective intuitions, naturalistic Twitter examples, and experimental evidence), we argue that activity emoji (case study I) are essentially event descriptions that serve as separate discourse units (similar to *free adjuncts*) and connect to the accompanying (linguistic) text by virtue of suitable discourse relations. By contrast, face emoji (case study II) are expressive elements that are anchored to an attitude holder and comment on a proposition provided by the accompanying text. We provide further evidence for the distinct behavior of face emoji and activity emoji by looking at their scopal behavior with respect to linguistically-expressed negation. In particular, we probe interactions of emoji and texts that contain clausal negation, and conclude that both face emoji and activity emoji generally do not scope under negation. However, the appearance of such a scope relation arises with activity emoji when the emoji are connected to the accompanying text by virtue of an Explanation discourse relation. With face emoji, scopal interactions seem to appear in cases where the default interpretation would result in a discourse contribution that is pragmatically infelicitous, and also in cases that involve a specialized emoji-repetition construction where a repeated alternation of face emoji with words assumes a scope-marking role.

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1 Introduction

Today, emoji¹ (e.g. 😊, 😞, 🦄, 🍷) are widely-used in digital communication and have emerged as an object of study in linguistics and beyond (see e.g. Bai et al. 2019 for a recent overview). Emoji appear frequently in text messages, social media posts, emails and other kinds of digital communication. We will collectively refer to all of these types of texts with the term *message*, which thus subsumes text messages, blog posts, etc. There are different subtypes of emoji, including faces (e.g. 😊), activity-related objects (e.g. 🍷, 🍷) as well as symbols, flags and so on (e.g. 🇩🇪, 🇩🇪). They occur in different positions, including at the start of a message, the end of a message, or message-internally (see e.g. Garrison et al. 2011; Al Rashdi 2015; Cramer et al. 2016; Sampietro 2016; Na’aman et al. 2017). In digital communication, the widespread use of emoji — including the frequent phenomenon of combining emoji and text — suggests that they play an important communicative role. This makes emoji a cognitively relevant human artifact for researchers interested in the study of human communication generally as well as linguistic communication specifically. Indeed, in linguistic venues, there has been growing interest in emoji (e.g. Cohn et al. 2019; Gawne & McCulloch 2019; Maier 2021; Pierini 2021; Grosz 2022; Pasternak and Tieu 2022; Scheffler et al. 2022; Grosz, Greenberg, De Leon & Kaiser 2023), with contributions focusing for instance on the semantic/syntactic properties of emoji on their own (e.g. Cohn et al. 2019), as well as on the semantic/syntactic interplay between emoji and text (e.g. Gawne and McCulloch 2019). In the present paper, we take initial steps towards a formal semantic classification of emoji and their relation to the text that they accompany. We focus on two sets of emoji, which we label *face emoji* and *activity emoji*, and argue that they differ in their semantic properties — in particular, we propose that these two subsets of emoji exhibit perspective dependence and discourse anaphoricity, respectively, with regards to individuals whose attitudes or actions the emoji encode. Based on naturally-occurring *Twitter* examples and native-speaker intuitions, and making use of insights from theoretical linguistics, we claim that face emoji and activity emoji are interpreted in different ways: we analyze face emoji as sharing the perspective dependence of expressives (with a preference for first-person indexicality), whereas activity emoji describe events with a contextually determined agent argument, whose interpretation is constrained by discourse coherence. Note that we also assume that connections between face emoji and accompanying text are anaphoric in that face emoji retrieve aspects of the text (such as a salient proposition) from the context, rather than *syntactically* combining with the text. This is orthogonal to our discussion of the difference between face emoji and activity emoji, for which we establish the distinction between perspective-sensitivity vs. discourse-anaphoricity.

We define our two core terms as follows: *face emoji* have the shape of a yellow disc with stylized facial expressions (e.g. 😊 and 😞). We limit our discussion to face emoji that have an affective

¹ In English, *emoji* has two plural forms, *emoji* and *emojis*. In this paper, we use the unmarked form *emoji*.

meaning, e.g. conveying ‘happy’, ‘sad’, ‘surprised’ or ‘worried’ (similar to facial expressions; see Russell & Fernández-Dols 1997, Fugate & Franco 2021); we will thus use the term *face emoji* as a short-hand for *affective face emoji*, and thereby exclude non-affective face emoji.² Moreover, we maintain that (affective) face emoji may be a subset of a broader class of affective emoji, which includes hearts (💖, ❤️, ❤️) and certain body parts (👍, 🙌) that have a similar affective meaning. We borrow the term ‘affective meaning’ from the philosophical literature, where it generally refers to the meaning expressed by utterances or facial expressions communicating the speaker’s affective mental states (e.g., emotions, moods, phobias, etc.) about propositions/states of affairs (e.g., Bonard & Deonna 2022). By contrast, we define *activity emoji* as emoji that look like objects (🏠) or people (👩) and describe a related activity (🏠 can mean ‘surfing, to surf’) or property (👩 can also mean ‘to be a surfer’).^{3,4} This is a *functional* definition, i.e., it is based on available functions of a given emoji rather than on its intrinsic semantic properties. We therefore define activity emoji as emoji that *lend themselves* for describing an activity, which sets them apart from emoji like 🐶 or the 🌲 that do not.

1.1 Prior research on emoji

In recent years, emoji have been investigated from a wide variety of perspectives: In addition to an emerging body of linguistic research, emoji have been researched in fields as varied as computer science (see e.g. LeCompte & Chen, 2017 on sentiment analysis), marketing research and communication (see e.g. Luangrath et al. 2017, see also Jaeger et al. 2019 on emoji valence), psychology (see e.g. Li et al. 2018 on personality traits and emoji use), health communication (see e.g. Troiano & Nante 2018), and education (see e.g. Dunlap et al. 2016 on emoji in online learning). We refer readers to Bai et al. (2019) for a recent overview.

² There are some face emoji that predominantly seem to have a non-affective reading, such as the ‘face with medical mask’ emoji 🤒, which mainly seems to be used to denote the property/activity of wearing a face mask. While we do not exclude that such an emoji too could have an affective reading (e.g., to express emotional distress relative to health) we take its interpretation to be prototypically non-affective, like 😊 or 😞. We leave an investigation of such face emoji open for future research.

³ The face emoji we investigate are part of the Unicode 14.0 category ‘Smileys & People’, whereas many activity emoji are part of the category ‘Activity’. See <https://emojipedia.org/people/> and <https://emojipedia.org/activity/>. However, the details of the Unicode classification are not crucial for us. For instance, we treat the object-denoting image of a pizza slice 🍕 (in the reading ‘to eat pizza’) as an activity emoji, although it is in the category ‘Food & Drink’. Conversely, some emoji in the ‘Activity’ category may not count as activities according to our definition given above. Semantically, we do not require *activity emoji* to be activities in the spirit of Vendler (1957); some of them may denote states or properties. We also remain agnostic as to whether all activity emoji denote eventualities in the spirit of Davidson (1967). These open issues are not crucial for the basic claims made in this paper.

⁴ We do not exclude the possibility that there are emoji that are ambiguous between an affective emoji and an activity emoji; for instance, Storment (2022) argues that the ‘pleading face’ emoji 😞 has an affective reading and a (derived) activity reading; such ambiguities are not in the scope of this paper. Conversely, the ‘woman dancing’ emoji 💃 seems to be ambiguous between a positively valenced affective reading and a more literal activity reading.

Most relevantly for us, emoji have also attracted the attention of a growing number of linguists, as already noted above (see also Evans 2017 for recent discussion). From a linguistic perspective, researchers have investigated the combinatorial properties of emoji sequences, e.g. whether strings of emoji have grammatical/syntactic properties. For example, in important foundational work incorporating both face emoji and activity emoji, Cohn et al. (2019) provide experimental evidence indicating that emoji have only restricted combinatorial properties and do not have grammatical structure of their own. (However, see also Gerke & Storoshenko 2018 for evidence that people’s native language may influence their emoji ordering preferences.) More closely related to our work is research on the relation between emoji and the linguistic elements that they typically occur with. One way of approaching this relation is represented by the work of Gawne & McCulloch (2019), who analyze some emoji as digital counterparts of the gestures and facial expressions that accompany spoken language. Another approach relevant for our aim of investigating the relation between emoji and text is Maier’s (2021) proposal, which analyzes face emoji and facial expressions as use-conditional items (see Gutzmann 2013) and which we review in Section 4.2. Our research builds on these prior studies, and systematically explores the behavior of both face and activity emoji in contexts involving the interplay of linguistic strings (words) and emoji.

1.2 Aims of this work

Our research positions itself in the tradition of emerging formal semantic research on digital communication (e.g. Bücking & Rau 2013). In the present paper, we propose that a semantic distinction needs to be made between [i.] face emoji, which typically convey affective information, and [ii.] activity emoji, which convey information about actions and activities. More specifically, we show that face emoji and activity emoji differ in their linguistic properties, with face emoji incorporating perspective dependence, with a preference for first-person indexicality, while activity emoji incorporate anaphoricity in connection with the inferred agent of the emoji-related activity (or holder of the emoji-related property). In the rest of this paper, we take initial steps towards a formal semantic analysis of these two subsets of emoji.

In terms of empirical data, our strategy is as follows. In this paper, we focus on using both constructed and naturally occurring examples to establish solid intuitions, which are captured by initial hypotheses. In current and on-going work, we test these hypotheses experimentally (using psycholinguistic methods such as the forced-choice task in Kaiser & Grosz 2021), thereby corroborating the validity of using constructed examples and introspective intuitions for emoji. It is worth pointing out at this stage that many of the examples used in this paper are naturally-occurring examples from Twitter (marked with a ^[twitter] superscript). When citing text from social media, one is faced with questions of ethics and privacy (see e.g. Ayers et al. 2018, Tatman 2018). In this paper, we remove authors’ user names and suppress URLs, but keep the posts as

they are, to ensure the linguistic integrity of the examples; all personal names *within* Twitter posts were replaced with *John, Smith* or *John Smith*, and @-signs were removed. (None of our examples concern sensitive topics or private information.) This cautious approach to protecting personal data entails that Twitter examples only show up in a reverse search if authors' account settings permit, and disappear if authors delete posts, or make their account private. It is not unusual for web corpus data to disappear over time; many URLs in the British WaCky Web Corpus *ukWaC* (Baroni et al. 2009) are broken links as of December 2022.⁵

If the original Twitter post contained multiple emoji, we maintain them in our examples for reasons of completeness (unless marked otherwise). However, the present work focuses on message-final emoji and on the first emoji in a sequence. We leave the intriguing question of emoji sequence interpretation for future work. We chose to focus on message-final emoji because several empirical studies show that they are the most frequent (e.g. Garrison et al. 2011; Novak et al. 2015; Al Rashdi 2015; Cramer et al. 2016; Sampietro 2016; Na'aman et al. 2017; Seyednezhad et al. 2018). Emoji can also occur in other positions (e.g. message-medially and even message-initially), but these positions are less frequent; we leave them for future work as well.

To establish individual emoji meanings in a non-subjective way, we draw on: (i) the form of the emoji, i.e. what they resemble, (ii) the non-academic reference website *Emojipedia*,⁶ and (iii) emoji norming studies, emerging in increasing numbers (e.g. Ferré et al. 2022). For emoji-text combinations, we use introspective intuitions of emoji users, which are later verified in controlled experiments (e.g. intuitions from Grosz et al. 2023 were corroborated experimentally in Bjertnes 2022).

Our empirical claims, in a nutshell, are as follows. As discussed in Section 2, we propose that **activity emoji** (e.g. 🏀, 🍌, 🏈) incorporate anaphoricity, in the descriptive sense of referring back to a previously-mentioned referent. To illustrate what we mean by *anaphoricity*, consider examples (1a-b), which are identical except for the verb (*impressed* vs. *admired*). In (1a), the basketball emoji is likely to convey that Sue impressed Ann because of how she (*Sue*) played basketball. In contrast, in (1b), the emoji will probably be interpreted as conveying that Sue admired Ann because of how *Ann* played basketball. That is, connected to the fact that the basketball emoji provides an explanation for the preceding predicate (being impressed or admiring), the inferred agent of basketball-playing is different in (1a) and (1b). As we show in Section 2.2, we can straightforwardly derive this difference from prior work on pronoun resolution if we assume that activity emoji [i.] involve anaphoricity and [ii.] are sensitive to discourse relations (e.g. Explanation, Elaboration, Resemblance) in ways that parallel the sensitivity observed in prior work on pronoun resolution. (We view our observations as being

⁵ [https://www.clarin.si/noske/wacs.cgi/first_form?corpname=ukwac;align=.](https://www.clarin.si/noske/wacs.cgi/first_form?corpname=ukwac;align=)

⁶ [https://emojipedia.org/.](https://emojipedia.org/)

in line with the claims of Hobbs 1979 and Kehler 2002 that pronoun resolution in the linguistic domain is a side-effect of general inferencing processes about coherence.) Informally speaking, the basketball emoji in (1a) is anaphorically connected to *Sue*, whereas the basketball emoji in (1b) is anaphorically connected to *Ann*.

- (1) a. Sue impressed Ann 🏀
 b. Sue admired Ann 🏀

We propose that activity emoji denote separate discourse units, which freely associate to the text via suitable discourse relations, as exemplified in (2) and (3) for Explanation and Elaboration relations. (Throughout this paper, we use the wave arrow ‘ \rightsquigarrow ’ to mark meaning inferences without committing to a particular status of the inference, e.g. whether it is entailed, presupposed or implicated.) We start with an informal understanding of discourse relations: for example, *Elaboration* describes a situation where the events in a discourse unit β are sub-events of the events in a (preceding) discourse unit α (i.e. β elaborates on α); see Asher & Lascarides (2003: 159).

- (2) Arsenal really impressed me ! 🏆 [twitter] Discourse Relation = *Explanation*
 \rightsquigarrow a football-playing event β explains the impressing event α
- (3) Getting ready for tomorrow! 🏋️ [twitter] Discourse Relation = *Elaboration*
 \rightsquigarrow a training event β is a part of the getting-ready event α

In contrast to activity emoji, we propose that **face emoji** (e.g. 😲, 😊, 😞) (e.g. Riordan 2017, Jaeger et al. 2019) — and presumably also other affective emoji, such as 👍, ❤️, 🍷 — exhibit perspective dependence. To see this, let’s consider (4a-b).

- (4) a. Sue impressed Ann 😲
 b. Sue admired Ann 😲

Examples (4a-b) are the same as (1a-b), except that the basketball emoji has been replaced by the ‘surprised face’ emoji. Now, we no longer see the referential switch from Sue to Ann that we observed in (1a-b). Instead, in both cases there is a strong bias to interpret the surprised face emoji as reflecting the emotional state of the first-person author of the entire message, rather than Sue or Ann. This default bias for first-person indexicality is known to be a property of expressives (e.g. *damn*, see Potts 2007; Lasersohn 2007; Amaral et al 2007; Harris & Potts 2009). As we show in Section 3, we propose that face emoji have lexical entries along the lines of what is exemplified in (5) for the ‘surprised face’ emoji (based on the approach to expressive presuppositions from Sauerland 2007 and Schlenker 2007), where w_o is the utterance situation, and $author_o$ the author in the utterance situation; both have their values assigned by a contextual assignment function g to allow for reported utterance situations. Our lexical entries do

not assume any syntax or direct compositionality for emoji; the notation in (5) is based on Egg’s (2012) notation for discourse particles, where p arguments are retrieved from the context.^{7,8} As a consequence of this indirect (*anaphoric*) connection between face emoji and their propositional argument p , it is worth highlighting that face emoji are strictly speaking also anaphoric elements. However, since we focus on the different ways in which face emoji and activity emoji determine their attitude holder and agent, respectively, we reserve the term *anaphoric(ity)* for discussions of how activity emoji retrieve the agent of the denoted event — which we argue to be similar to the way in which pronouns retrieve their referents.

(5) $[[\text{😬}]]^s(p)$ iff $g(\text{author}_o)$ has a surprised emotion/response towards p in $g(w_o)$

It is worth noting that face emoji are among the most frequently used emoji; as a group, they are used more often than activity emoji (see e.g. Emojitracker 2021). This is presumably related to their resemblance to facial expressions, which play a central role in human communication. There exists a large literature on facial expressions (e.g. Tomkins & McCarter 1964; Ekman & Friesen & Ellsworth 1972; Russell & Fernández-Dols 1997; Fernández-Dols & Russell 2017 i.a.), but an in-depth discussion of the nature of the relation between face emoji and facial expressions (see, e.g., Fugate & Franco 2021, but also Maier 2021) is beyond the scope of this paper.

The structure of this paper is as follows. Section 2 focuses on activity emoji and presents our analysis that emoji in this subclass involve anaphoricity and are related to the linguistic text that they accompany by means of discourse-level coherence relations. We also look at the scopal behavior of activity emoji, showing that while they are typically interpreted outside of the scope of the negation, the discourse relation at play makes a crucial contribution. In Section 3, we turn to face emoji. This section presents our proposal that the semantics of face emoji is similar to that of expressives (e.g. *damn*, *friggin’*, *yay*, *boo*) and that this subclass of emoji exhibits perspective sensitivity: it is by default anchored to the first-person sender (akin to the first-person orientation exhibited by expressives and other perspective-sensitive expressions). As regards scopal behavior, we show that face emoji typically outscope negation, but suggest that ‘beat-related face emoji’ (a particular way in which face emoji are repeated throughout a part of the message) may have an emerging potential to be interpreted under the scope of negation. Section 4 brings together our findings for activity and face emoji. In Section 4, we also identify a

⁷ A representative example of emoji that comment on a proposition not expressed by adjacent text is given in (i); here, the emoji comments on the Board’s actions being despicable, not on the wish for the addressee to be ok.

(i) that’s despicable from the Board!! Hope you’re ok 🙄 [twitter]

⁸ Note that this lexical entry treats the attitude holder (author_o) and the world of evaluation (w_o) as indexicals, i.e. the first-person indexicality is hard-wired. However, as we will show in Section 3.2, there must be cases where both of these variables shift to another attitude holder and situation, even though we maintain that first-person indexicality is the default; the details of modeling a shifted interpretation exceed the scope of this paper.

question for future work that is beyond the scope of the present paper, namely how to determine the core meanings (i.e. the lexical entries) of emoji, and explore two possible approaches, the iconic (picture-based) approach and the lexicalist (convention-based) approach.

2 Case study I: anaphoricity in emoji resolution

2.1 Activity emoji and discourse relations

Turning towards a formal implementation, our core proposal amounts to treating activity emoji as non-restrictive modifiers that denote an eventuality and/or property (Davidson 1967). In thinking about the relation between an activity emoji and the text that it accompanies, we draw inspiration from prior work on modifiers such as the gerunds *playing the violin* and *being an artist* in (6b) and (7b) (such gerunds being a paradigm case of *free adjuncts*, see Stump 1985: 42, though we do not claim that activity emoji should be analyzed in precisely the same way as gerunds). These gerunds act as independent utterances (see Zobel 2019, i.a.) that are connected to their ‘host clause’ by virtue of salient discourse relations (see Hobbs 1979; Lascarides & Asher 1993; Kehler 2002; Asher & Lascarides 2003). In other words, there is no direct compositionality between activity emoji and the accompanying text. It is not central to the claims in this paper whether or not activity emoji should receive a semantic analysis that treats them exactly like free adjuncts. However, the inspiration that we draw on is brought out by using gerunds in the paraphrases.

- (6) a. *Original example:* My job is pretty fun 🎸 [twitter]
 b. *Sample paraphrase:* My job is pretty fun, [playing the violin / being a violinist]
 c. 🎸 → a violin-involving eventuality/property
- (7) a. *Original example:* work today was fun 🎨 [twitter]
 b. *Sample paraphrase:* work today was fun, [being an artist / creating art]
 c. 🎨 → an artist-involving property/eventuality

Our paraphrases intentionally highlight ambiguities such as *playing the violin* (activity) vs. *being a violinist* (state). In fact, as pointed out to us by Emar Maier and Louise McNally, the actual semantics of 🎸/🎨 may be more minimal, e.g. ‘(there is a) violin/artist’; crucially, emoji-containing examples would routinely require such a minimal semantics to be coerced into something eventive or stative, to yield (6b) or (7b). We view this kind of simple semantics as advantageous, as it seems that meanings associated with particular emoji can vary considerably but are nevertheless constrained by context and real-world knowledge; emoji-text interaction could well be as broad yet contextually restricted as noun-noun compounding. We leave the details for future research (see also discussion in Section 4), but note that similar kinds of ambiguities are well-attested in natural language expressions, see e.g. Asher (2011).

We propose that an approach based on discourse relations can be applied systematically to the relation between activity emoji and the texts they accompany. This is exemplified in (8)-(12) for a (non-exhaustive) set of five different discourse relations (Explanation, Elaboration, Narration, Background, and Result). For ease of exposition, our presentation of each of these examples is structured in the same way: (8a) names and defines the discourse relation, (8b) presents a natural-language example (all from Lascarides & Asher 1993: 55), (8c) contains a naturalistic emoji example from Twitter, and (8d) provides a paraphrase of (8c) in line with (8a). When discourse relations connect entities such as clauses or emoji, these entities can be referred to with the term *discourse unit*. The Greek letter α refers to the first unit (which is *Max fell* in (8b) and *I really admire this man* in (8c)) and the letter β refers to the second unit (which is *John pushed him* in (8b) and the activity emoji 🎸 in (8c)). Examples (9)-(12) are parallel.

- (8) a. **Explanation** (β explains why the eventuality in α happened/arose)
 b. *in language*: [α Max fell.] [β John pushed him.]
 c. *with emoji*: I really admire this man 🎸❤️ [twitter]
 d. \leadsto [α I really admire this man] because of [β his violin-playing]
- (9) a. **Elaboration** (the event in β is part of the event in α)
 b. *in language*: [α The council built the bridge.] [β The architect drew up the plans.]
 c. *with emoji*: When you can't walk normal anymore that's when you know you have trained hard 🏃 #legsaredead [twitter]
 d. \leadsto [α training hard] includes [β playing football]
- (10) a. **Narration** (β temporally follows α)
 b. *in language*: [α Max stood up.] [β John greeted him.]
 c. *with emoji*: JUST ARRIVED AT SPAREZ ! 🎳🏏 [twitter]⁹
 d. \leadsto [α arriving at SpareZ] is followed by [β playing bowling and billiard]
- (11) a. **Result** (α causes β)
 b. *in language*: [α Max switched off the light.] [β The room was pitch dark.]
 c. *with emoji*: it's rest day but I was bored 🏍️ [twitter]
 d. \leadsto [α it's rest day but I was bored] causes [β bike-riding]
- (12) a. **Background** (β provides background/circumstance under which α happens)
 b. *in language*: [α Max opened the door.] [β The room was pitch dark.]
 c. *with emoji*: Think ima have a nice good talk with John tomorrow!!! 🎩✂️ [twitter]
 d. \leadsto [α my talk with John] happens with a backdrop of [β barber-related events]

⁹ This post appears to refer to *SpareZ Bowling Center* in Davie, Florida.

Note that, in prior work on speech-accompanying gestures, Lascarides & Stone (2009) and Hunter (2019) argue that such gestures are integrated with the accompanying text on the basis of suitable discourse relations. This idea parallels our proposal for emoji, and thus provides additional support for our approach. Maier (2021), who takes a different approach to the lexical entries of emoji from the one we propose, shares our view that discourse relations are operational in establishing the meanings of certain text-emoji combinations. It is also worth emphasizing that our approach allows for the emoji-text connection to be unconstrained and potentially ambiguous to the receiver of the message. For instance, consider (10c) and (11c), which we take to be illustrative of Narration and Result, respectively. In both examples, other discourse relations appear to be available: (10c) could be interpreted as Background, giving rise to the inference that *SpareZ* is where *playing bowling and billiard* happens; (11c) could illustrate Elaboration, i.e., *rest day* includes *biking-related activities* (e.g., if the sender of the message is competing in a cycling race). Note that this underspecification of emoji-text combinations mirrors that of text sequences: ‘*John fell. He saw Mary.*’ could be interpreted as Explanation, Narration, Background, etc. The flexibility in the emoji-text connection is exemplified in (13a). This example seems to be compatible with all five of the above discourse relations, as illustrated in (13b-f). This example also shows variability in the text (α) that the emoji comments on, which is ambiguous between the entire clause (*so glad I stayed home today*), (13b), and the embedded clause (*I stayed home today*), (13c-f).

- (13) a. So glad I stayed home today 🎮👍 [twitter]
 b. *Explanation*: [β video-gaming] **explains** [α me being glad about staying home]
 ~ ‘I’m glad I stayed home because I could then play video games.’
 c. *Elaboration*: [β video-gaming] **was a part of** [α me staying home]
 ~ ‘I’m glad about staying home, part of which was playing video games.’
 d. *Background*: [β video-gaming] **describes circumstances of** [α me staying home]
 ~ ‘I’m glad I stayed home, which is where video games happen.’
 e. *Narration*: [α me staying home] **is/was followed by** [β video-gaming]
 ~ ‘I’m glad I stayed home, and now I will play video games.’
 f. *Result*: [α me staying home] **was the cause for** [β video-gaming]
 ~ ‘I’m glad I stayed home, and, as a result, I played video games.’

2.2 Enter anaphoricity in activity emoji

We propose that activity emoji (such as 🏀 and 🎮) share a further property with free adjuncts such as gerunds (in addition to using discourse relations to connect to the accompanying text). They have an anaphoric component, relating to a previously-mentioned referent (as we saw in the *Sue/Ann*-basketball example (1)) or, in some cases, relating to an implicit agent (as we will see in (18b)). To illustrate this claim, consider (14a) (repeated from (3)), under the plausible reading where it involves an *Elaboration* discourse relation, as well as the *Explanation* example

(15a) (repeated from (2)). A first attempt at a formalization of the integration of the emoji in (14a)/(15a) is given in (14b)/(15b) (loosely inspired by non-emoji work by Fabricius-Hansen & Haug 2012: 165 on gerunds). The symbol \leq stands for ‘sub-event of’, i.e. $e_i \leq e_k$ symbolizes that e_i is part of a complex event e_k . The event e_1 in (14)/(15) is the event described by the text; e_2 is described by the emoji. Based on the discourse relation that connects them, a more complex event e results, with e_1 and e_2 as sub-events. In (14b), the agents x and y of the getting-ready event and the weight-lifting event are free variables that need to be contextually resolved (here, x and y are both identified with the author of the post); in parallel, x , y and z are free variables in (15b). While (14b-c)/(15b-c) are formal renderings of the emoji-text combinations in their entirety, we revisit the lexical entries of the emoji themselves in Section 4; to foreshadow that discussion, we remain agnostic with regards to the question of how much of (14b-c)/(15b-c) is due to the lexical meaning of the emoji, and how much is due to pragmatic enrichment.

- (14) a. Getting ready for tomorrow! 🏋️ [twitter] *Elaboration*
 b. $\lambda e.[x,y,e_1,e_2 \mid \text{getting-ready}(e_1,x), \text{lifting-weights}(e_2,y), e_1 \leq e, e_2 \leq e]$
 c. *in words*: a weight-lifting event e_2 (with agent y) is a part of the getting-ready event e_1 (with agent x) (\Rightarrow we infer: $y=x=author$)
- (15) a. Arsenal really impressed me! 🏆 [twitter] *Explanation*
 b. $\lambda e.[x,y,z,e_1,e_2 \mid \text{impress}(e_1,x,y), \text{cause}(e_1,e_2), \text{playing-football}(e_2,z), e_1 \leq e, e_2 \leq e]$
 c. *in words*: a football-playing event e_2 (with agent z) caused the impressing eventuality e_1 (with stimulus x and experiencer y) (\Rightarrow we infer: $z=x=Arsenal$)¹⁰

Evidence for an anaphoric component in activity emoji (as modeled by the free variables in (14) and (15)) stems from effects such as *implicit causality* (e.g. Garvey & Caramazza 1974; Hartshorne & Snedeker 2013; Bott & Solstad 2014, and many others). The phenomenon of implicit causality is illustrated in (16) (coreference marked by bold type), and amounts to the following observation: an ambiguous pronoun in a causal adjunct (*she* in *because she was hix*¹¹) is preferably resolved towards the stimulus argument of a main-clause psych predicate. Since *impressed* is a stimulus-experiencer verb, *she* is preferably resolved towards Sue in (16a); by contrast, with the experiencer-stimulus verb *admired* in (16b), *she* is resolved towards Ann.

- (16) a. *stimulus-experiencer verb*: sue impressed ann because **she** was hix
 b. *experiencer-stimulus verb*: sue admired ann because **she** was hix

Crucially, we find exactly the same patterns of resolution with activity emoji when the intended discourse relation is *Explanation*. This is schematically illustrated in the constructed minimal pair in (17ab).

¹⁰ Since Arsenal is the syntactically represented stimulus argument of the verb *impress*, we also take it to be the semantic stimulus in *impress*(e_p,x,y). See Bott & Solstad (2014) for a more nuanced discussion.

¹¹ Following Hartshorne & Snedeker (2013), *hix* is a nonce word in order to avoid influence from world knowledge.

- (17) a. **sue** impressed ann 🏀 ↷ (because of how) **sue** played basketball
 b. sue admired **ann** 🏀 ↷ (because of how) **ann** played basketball

Naturalistic examples are in (18), with stimulus-experiencer verbs, and in (19), with experiencer-stimulus verbs. The examples in (18) echo the stimulus-experiencer pattern that we see in (16a) and (17a): The agent of the emoji event is identified with the stimulus of the preceding verb (e.g. the subject of *impressed* in (18a)). To unpack these examples, each of them contains a stimulus-experiencer verb (*impress*, *disappoint*, *inspire*, *amaze*, *shock*, *surprise*). In some cases, both arguments are overt, as in (18a), where the stimulus is *Arsenal*, and the experiencer is *me*, i.e. the author of the message. In other cases, both arguments are missing, as in (18b), which is a passivized truncated clause; here, the stimulus of *disappoint* is the implicit ‘agent’ of *disappoint* (‘disappointed **by** *x*’) and the experiencer is the dropped subject (‘I am [ready to be disappointed]’). In each of (18a-f), the agent of the emoji event is resolved towards the stimulus argument (overt or not) of the predicate in the text. A possible paraphrase for (18b) could thus be given as follows: ‘I am ready to be disappointed by someone, namely by the football-player(s)’. Our analysis of (18a) was spelled out in (15). See also Bott & Solstad (2014) on the connection between stimulus arguments (= individuals) and their activities, which are the cause of an experience in sentences with psych predicates.

- (18) *Implicit causality effects with stimulus-experiencer verbs* [twitter]
- a. Arsenal really impressed me ! 🏀 (agent_{football} ↷ stimulus_{impress})
 b. Ready to be disappointed 🏀 😞 (agent_{football} ↷ stimulus_{disappoint})
 c. I am so impressed you’re pushing on! Because of you I’m joining a class on Wednesdays. Thanks for inspiring me! 🏋️ (agent_{weight-lifting} ↷ stimulus_{inspire})
 d. Don’t forget John Smith – you will be amazed! 🎸 (agent_{guitar} ↷ stimulus_{amaze})
 e. I’m going to shock the World!!!! 🏀 (agent_{basketball} ↷ stimulus_{shock})
 f. Two new HHH_NB songs hit my inbox earlier today. They always know how to keep me on my toes and surprise me. 🎸🎸🎸 (agent_{guitar} ↷ stimulus_{surprise})

Similarly, the examples in (19) corroborate the experiencer-stimulus pattern that we see in (16b) and (17b). Once again, in all of the examples in (19), the agent of the emoji event is identified with the stimulus of the preceding verb (e.g. the object of *envy* in (19a)). In (19a), the stimulus of *envy* is identified with the referent of *a lot of people*, while the experiencer is identified with *I*, i.e. with the author; again, a paraphrase could be given as follows: ‘I envy a lot of people right now, namely those who play football’. As in (18), there are cases of truncation, such as (19b), which behave the same way.

- (19) *Implicit causality effects with experiencer-stimulus verbs* [twitter]
- a. I envy a lot of people right now 🏀 (agent_{football} ↷ stimulus_{envy})
 b. Still admire John Smith 🏀 (agent_{football} ↷ stimulus_{admire})

- c. Ok so I actually made it on time and also got to reunite with John after the concert!
I really admire this man 🎻❤️ (agent_{violin} → stimulus_{admire})
- d. She is literally such a beautiful person. I love her so much. 🏄‍♀️
(agent_{surfing} → stimulus_{love})
- e. For John Smith cause he’s awesome and I love him 🎺😊 (agent_{trumpet} → stimulus_{love})

In sum, we have argued that activity emoji serve as free-standing event descriptions, whose core argument is anaphoric, and which connect to the accompanying text through suitable discourse relations. This idea receives further support from experimental work by Kaiser & Grosz (2021) on the interpretation of activity emoji. As we will see in Section 3, face emoji exhibit a different behavior. However, let us first take a look at the scopal behavior of activity emoji, which provides further evidence for our claim that discourse relations play a key role with activity emoji.

2.3 Activity emoji and scope

So far, we have argued for a formal semantics of activity emoji, which can form the foundation for more intricate questions. Specifically, Pierini (2021) and Pasternak & Tieu (2022) investigate whether activity emoji can scopally interact with material inside the accompanying text. In the rest of this section, we proceed to revisit this question based on our new findings. In particular, we show that (i) activity emoji have a strong preference to scope *over* (or rather *outside*) all accompanying text, but (ii) if activity emoji combine with an Elaboration discourse relation, the appearance of scope interactions can be attested. Thus, these observations provide further evidence in favor of our claim that discourse relations play a key role in the interpretation of activity emoji. We will discuss the relation between face emoji and scope in Section 3.3.

2.3.1 Prior literature on the projection of activity emoji

Recent research in linguistics argues that different kinds of non-speech material, like gestures (Ebert & Ebert 2014; Schlenker 2018) and sound effects (Pasternak 2019), exhibit *projection behavior* in combination with speech (for work purely within the linguistic domain on projection, see e.g. Karttunen 1973; Heim 1983; Van der Sandt 1992). In other words, they interact in non-trivial ways with logical operators (e.g. negation, modals, conditionals, quantifiers, etc.) in the accompanying speech, as is characteristic of non-at-issue inferences, such as presuppositional and supplemental meaning.¹² Following these studies, Pierini (2021) and Pasternak & Tieu (2022) argue that text-accompanying activity emoji display the same projection behavior as co-speech gestures (based on Schlenker’s 2018 account of the projective properties of gestures).

¹² *Supplemental meaning* is the meaning conventionally associated with constructions such as non-restrictive (appositive) relative clauses, see, e.g., Huddleston & Pullum (2002), as discussed in Potts (2005: 92).

In particular, they argue that activity emoji, when appearing in a message-final position,¹³ as in (20), can be interpreted in the scope of negation,¹⁴ with the projection behavior of conditionalized presuppositions (also called *co-suppositions* by Schlenker 2018), i.e. presuppositions in which the content of the emoji is conditionalized on the affirmation of the negated clause in the accompanying text. (See Section 2.3.3 for a more nuanced rendering.)

- (20) John didn't train today 🏋️ (from Pierini 2021: 725)
 ↪ If John had trained today, weightlifting would have been involved

If this is true, then message-final activity emoji would project through negation in the same way as co-speech gestures do, as given in (21),¹⁵ following Schlenker (2018).

- (21) Little Johnny didn't [punish] + SLAP his team mate
 ↪ If Little Johnny had punished his team mate, slapping would have been involved

In what follows, we show how the projection patterns of activity emoji with negation can be captured using the analysis of activity emoji we proposed in 2.1–2.2.

2.3.2 Activity emoji outscope negation

In order to address the projection behavior of activity emoji, we start with naturally occurring examples where activity emoji occur with negation. In (22a) from Twitter, 🤔 appears together with an experiencer-stimulus verb, *envy*. If we analyze its non-negated, constructed counterpart (22b), we find that the intended discourse relation is Explanation. As predicted from the analysis we developed in Section 2.2, the agent of the event denoted by 🤔 is identified with the stimulus, *Smith*. This reading is preserved in (22c) (a simplified version of (22a)); here too the salient discourse relation appears to be Explanation. We observe that the emoji in (22c) does not seem to make its contribution in the scope of the negation; this is what we expect if the discourse relation is Explanation, since the emoji meaning serves as the explanation for the main proposition expressed by the text. As such, no projection as the kind described by Pierini (2021) and Pasternak & Tieu (2022) is detected, i.e. there is no evidence for a co-suppositional inference, as spelled out in (22d).

¹³ In their experimental stimuli, Pasternak & Tieu (2022) use text-surrounding emoji, such as (i) and (ii) (see <https://osf.io/2txjn/> for their complete set of stimuli). Since we focus on message-final emoji in this paper, we do not take this version into account, but we do expect our findings in Sections 2.3.2 and 2.3.3 to apply to such text-surrounding emoji as well.

(ii) The student will not 🚶 step out of the classroom 🚶

(iii) The party will not 🌂 be cancelled tomorrow 🌂

¹⁴ Pierini (2021) and Pasternak and Tieu (2022) argue that message-final activity emoji give rise to co-suppositional inferences when embedded under other entailment-canceling operators like modals, question operators and the quantifiers “none”, “each” and “exactly one”. In this paper, for sake of simplicity, we restrict our focus to the case of negation, leaving the discussion of these other cases to another occasion.

¹⁵ This example, modeled after examples in Schlenker (2018), stems from Pierini (2021: 723). The notation ‘[word] +SLAP’ indicates that the slapping gesture and the targeted word are simultaneous.

- (22) a. The whole story is rough. Don't envy Smith rn. 🤔 Why is John Smith Belgium coach? Does he secretly want France to win World Cup? ^[twitter]
 b. I envy Smith right now 🤔 Discourse Relation: *Explanation*
 ~> Smith's soccer-related activities are the reason for why I envy him
 c. I **do not** envy Smith right now 🤔 Discourse Relation: *Explanation*
 ~> Smith's soccer-related activities are the reason for why I **do not** envy him
 d. ➔ ? If I did envy him, it would be because of his soccer-related activities

A similar case can be made for stimulus-experiencer verbs, such as *disappoint*. Consider the Twitter example (23a). As spelled out in (23b) (parallel to (22c)), we find that the discourse relation by which 🏀 integrates with the text is, once again, Explanation. Here too, then the emoji scopes outside of negation. However, note that in this case a co-suppositional inference as in (23c) appears to be available *in addition* to (23b). This difference with (22) is explainable because 'basketball-playing' can be construed as the cause for disappointment more directly in (23) than 'soccer-playing' as the cause for envy in (22).

- (23) a. Our boys don't disappoint 🏀 #tribe ^[twitter] (Discourse Relation: *Explanation*)
 b. ~> Our team's basketball-playing is the reason for why they **do not** disappoint us
 c. ?? If they did disappoint us, it would be because of their basketball-playing

Cases where the salient discourse relation operative in the non-negated emoji-text combination is not Explanation seem to yield a similar analysis. Consider (24a) (modeled after (11)) and (25a) (modeled after (13)) whose interpretations are Result and Narration, respectively. Interestingly, the most salient interpretation of their negated counterparts (24b, 25b) switches to Explanation, with the emoji scoping outside negation. The co-suppositional inferences in (24c) and (25c), instead, are not available. Note that a general preference towards Explanation would be coherent with Sanders' (2005) *Causality By Default Hypothesis*, which states that a causal relation is assumed first by readers (and others are searched only insofar as it is not available) as it is the most informative representation of subsequent discourse units.

- (24) a. I was bored 🚲
 ~> Cycling is the result of being bored. (Discourse Relation: *Result*)
 b. I wasn't bored 🚲
 ~> Cycling is the reason for why I wasn't bored (*Explanation*)
 c. ➔ If I had been bored, I would have gone cycling
- (25) a. I went home 🎮
 ~> Going home is followed by video-gaming. (Discourse Relation: *Narration*)
 b. I didn't go home 🎮
 ~> Video-gaming is the reason for why I didn't go home (*Explanation*)
 c. ➔ If I had gone home, video-gaming would have been involved

2.3.3 Explaining the scope of activity emoji: effects of different discourse relations

Based on the discussion in Section 2.3.2, we affirm that activity emoji must scope outside of the negation whenever the intended discourse relation is Explanation. However, how do we explain cases like (20), in which the emoji seems to scope under negation, apparently giving rise to a conditional presupposition? We propose that this stems, crucially, from the discourse relation at hand: while many activity emoji are resolved by virtue of Explanation, activity emoji appear to be interpreted in the scope of negation when the intended discourse relation is *Elaboration*. An illustrative example (parallel to (20)) is given in (26). Recall from Section 1.2 that Elaboration holds in an emoji-text combination when the emoji-related events are sub-events of events described in the accompanying text.¹⁶ The effect of construing (26a) by virtue of Elaboration is spelled out in (26b); this gives rise to the inference in (26c), which resembles a co-suppositional inference of the type proposed in Pierini (2021) and Pasternak & Tieu (2022). For now, we leave open which of the following options is correct: [i.] On the one hand, the emoji in (26a) may be outscoping negation even with an Elaboration discourse relation, with (26c) arising as an illusion from (26a) + (26b). [ii.] On the other hand, the emoji may truly scope below negation in (26a), with a local-scope reading that manifests as in (26c) (where we use the term ‘local-scope reading’ to remain neutral on the exact nature of the not-at-issue inference involved).

- (26) a. Sue hasn’t trained for months 🏄
 b. \rightsquigarrow Surfing is part of training (*Elaboration*)
 c. \rightsquigarrow If Sue had trained, it would have involved surfing

In addition to the constructed example in (26a), we find naturally occurring Twitter examples, (27a) and (28a), which can be analyzed in the same way as (26), with the conditional inference in (27c)/(28c) possibly deriving from the Elaboration inference in (27b)/(28b).

- (27) a. didn’t train 🏊 [twitter]¹⁷
 b. \rightsquigarrow Swimming is part of training (*Elaboration*)
 c. \rightsquigarrow If author had trained, it would have involved swimming
- (28) a. Haha, no worries! I got nervous, I thought “But I didn’t train!” 🏃 [twitter]
 b. \rightsquigarrow Running is part of training (*Elaboration*)
 c. \rightsquigarrow If author had trained, it would have involved running

¹⁶ This is a simplified definition of Elaboration, which reduces to a part-of relation, glossing over more complex views of how Elaboration should be defined, including Asher & Lascarides (1993, 2003) and Kehler (2002).

¹⁷ The original example from Twitter was “didn’t train 🏊🤔”. We removed the emoji 🤔 for sake of simplicity. A possible interpretation of this complex version takes 🤔 to outscope the negation via Explanation, giving rise to the following reading: ‘Having to wear a mask is the reason for why I didn’t train. But if I had trained, it would have involved swimming.’ We thank an anonymous reviewer for providing this interpretation.

Note that in such examples (regardless of which option between [i.] or [ii.] is correct) the contribution of the emoji to the truth conditions of the utterances is equivalent to a contextual restriction: *training in the given context (by virtue of a relevant domain restriction) includes surfing/swimming/running*; (29b) is therefore a perfectly natural answer to the message (29a), whereas (29c) and (29d) are not, because they ignore that the domain of the predicate ‘training’ is contextually restricted by the emoji.

- (29) a. I haven’t trained for weeks 🚴
 b. {No, / That’s not true, / You’re lying,} I saw you ride the bike yesterday.
 c. # {No, / That’s not true, / You’re lying,} I saw you jogging yesterday.
 d. # {No, / That’s not true, / You’re lying,} cycling is not a part of training.

Before moving to face emoji, it is worth mentioning that Hunter’s (2019) analysis of the typology of the projective properties of co-speech gestures proposed by Schlenker (2018) is very similar to an analysis where (26c) arises from a combination of (26a) and (26b) (and the same for (27c) and (28c)). She suggests that all the examples of co-speech gestures with negation provided in Schlenker (2018) — which appear to give rise to conditional presuppositions — involve an Elaboration discourse relation.¹⁸ Future research will require careful empirical investigation of both gestures and emoji, to determine whether they must outscope negation, or whether they scope under negation, triggering a projective conditional inference.

In sum, this section showed that discourse relations matter when investigating the scopal behavior of activity emoji; these seem to outscope negation when the discourse at hand is Explanation, whereas they seem to be interpreted under the scope of negation when the discourse relation at hand is Elaboration.

3 Case study II: perspective sensitivity (1st person indexicality) in emoji resolution

3.1 Face emoji as expressive modifiers: basic proposal

Having argued that activity emoji have a semantic component similar to anaphoric elements and that their connection to accompanying text crucially depends on discourse relations, we now proceed to our proposal for face emoji. We argue that face emoji (and presumably affective emoji more generally) can be modeled on a par with expressives such as *damn* or *friggin’* (e.g. Potts 2007), or even maybe more accurately, with emotive interjections such as *yay*, *alas*, *ugh* or *boo* (see, e.g. Goddard 2013; Gutzmann 2013; Rett 2021; Grosz et al. 2023). The core intuition is

¹⁸ To give a concrete example, Hunter (2019: 322–323) argues that (iv) should be analyzed as in (v), and states: “something that might at first look like a conditional presupposition triggered by the gesture might be better understood as a side effect of whatever semantic mechanisms the gesture content is actually contributing to.”

(iv) Little Johnny didn’t [punish] + **SLAP** his team mate.

(v) Little Johnny didn’t punish his team mate. He didn’t slap him.

exemplified by (30). We argue that the 🙄 emoji — called the “enraged face” emoji on *Emojipedia* (originally called the “pouting face” emoji) — in (30a) makes a contribution that is very similar to the expressive element *friggin’* in (30b), or *ugh* in (30c). (Note that we are not claiming that (30a) and (30b-c) are identical in their meaning, simply that — as will become clear below — both the emoji and the expressives convey the author’s/speaker’s anger.)

- (30) a. sue sent the report to ann 🙄
 b. sue sent the **friggin’** report to ann
 c. sue sent the report to ann, **ugh!**

Crucially, whether face emoji behave like expressives or interjections, we predict that they exhibit perspective dependence, which manifests in a preference for *first-person indexicality*. The default attitude holder of the subjective affect conveyed by a face emoji is the author of the message (see Potts 2007; Lasersohn 2007 for expressives in natural language), although the attitude holder can shift away from the author in some contexts (see Amaral et al 2007; Harris & Potts 2009; Kaiser 2015; Kaiser & Grosz 2021).

To make this prediction explicit, we propose lexical entries such as (31a) and (31b) for negatively valenced (😞) and positively valenced (😊) emoji, respectively. For concreteness’ sake, these lexical entries build on an indexical presupposition approach (Schlenker 2007; Sauerland 2007), but nothing hinges on this choice. As shown in (31a), we propose that an emoji such as 😞 essentially adds a non-at-issue comment on the author’s feeling or attitude towards a proposition *p* (see Grosz et al. 2023 for a more involved analysis). This proposition *p* does not need to be directly encoded by the accompanying text, but amounts to a salient proposition retrieved from the context; this is shown in (32a), which intuitively receives the interpretation in (32b).¹⁹ Crucially, the person whose feeling/attitude is conveyed is typically the author (though it is known that the *author₀* variable can shift towards another attitude holder, as discussed in the next section).

- (31) a. [😞]^s(*p*) iff *g(author₀)* has a **negative** feeling/attitude towards *p* in *g(w₀)*
 b. [😊]^s(*p*) iff *g(author₀)* has a **positive** feeling/attitude towards *p* in *g(w₀)*
- (32) a. yessss plus that’s my fckn birthday 😞😞😞😞 [twitter]
 b. ~> The author in the utterance context has a negative feeling/attitude towards [_{*p*} something undesirable happens on the author’s birthday].

While the lexical entries in (31–32) are largely in line with Grosz et al. (2023), the present paper differs from Grosz et al. in terms of its aims, empirical scope and theoretical focus. Whereas Grosz

¹⁹ Repeatability of message-final face emoji to strengthen their expressive impact, observed by Gawne & McCulloch (2019) and illustrated in (32a), is much in line with the properties of other expressives (Potts 2005, 2007), but see Gutzmann (2013: 46–47) for a critical evaluation of repeatability as a marker of expressivity.

et al. look only at face emoji and focus on ‘minimalistic’ positive/negative evaluation (which they gloss as *happy/unhappy*), the present paper covers both face and activity emoji, distinguishes and analyzes a wider range of emotions, provides a discussion of discourse relations, and argues for the existence of two emoji types that differ in their semantic properties. Thus, the two papers complement each other.

3.2 Shifting perspective

So far, we have argued that the retrieval of an agent/property holder in activity emoji involves anaphoricity, whereas face emoji act like perspective-sensitive expressives when selecting their attitude holder, which exhibit a preference for 1st-person indexicality. Furthermore, it appears that just like many perspective-sensitive expressions, in the right context, the interpretation of face emoji can shift from the first-person author to another attitude-holder. This was shown experimentally by Kaiser & Grosz (2021) for face emoji in sentences with psych verbs, exemplified in the first row of **Table 1**.

Simplifying somewhat, bold type indicates: (i) the preferred resolution of the attitude holder of face emoji, (ii) who the activity emoji provides information about (presumably, who is inferred to be the agent). For a concrete example (“richie annoyed **adrian** 😞”), the information should be read as follows: participants preferred the face emoji to be interpreted as expressing Adrian’s emotion, as opposed to Richie’s, or the author’s. This shows that, with face emoji, shifting (here: from the author to Adrian) is possible if the character has the thematic role of experiencer, and both author and character are plausible attitude holders²⁰ (see Kaiser & Grosz 2021 for details). In contrast, activity emoji in Kaiser & Grosz’ experiment replicate the implicit causality patterns found in naturalistic data in (18) and (19), by preferring the stimulus argument (e.g. Richie, Aaron).

| | stimulus-experiencer verb | experiencer-stimulus verb |
|--|----------------------------------|----------------------------------|
| i. attitude holder (face emoji) | richie annoyed adrian 😞 | daniel admires aaron 😊 |
| ii. agent (activity emoji) | richie annoyed adrian 🥁 | daniel admires aaron 🏆 |

Table 1: resolution preferences.

²⁰ An interesting observation that is captured by Table 1 is that face emoji and activity emoji mirror each other in connection with psych predicates: face emoji can take the psych predicate’s experiencer as their attitude holder, whereas the agent / property holder of activity emoji is preferably identified with the psych predicate’s experiencer. For future studies on examples that combine face emoji and activity emoji, we predict that both can occur in the same example, as illustrated by (vi); such combinations are outside of the scope of the present paper.

(vi) richie annoyed adrian 🥁😞 ~ (predicted:) Richie played the drum, which annoyed Adrian.

In the case of face emoji, Kaiser & Grosz focused on contexts where both characters (as well as the author) are, in principle, plausible attitude holders for the face emoji (e.g. Daniel could be happy because he is admiring Aaron, and/or Aaron could be happy because he is admired). However, what happens if the characters are not plausible attitude holders – in other words, if the emoji is not semantically compatible with them? This is exemplified in (33). Here, emoji users’ introspective judgments suggest the judgments indicated by the prefixes ‘OK’ (definitely acceptable), ‘??’ (marginally acceptable), ‘?#’ (more or less unacceptable), and ‘#’ (definitely unacceptable). In (33), we see a preference for the emoji to be resolved towards the author of the message. (For completeness, we also provide judgments from emoji users for the same text paired with an activity emoji, which align with Kaiser & Grosz’ experimental results.)

(33) *1st-person indexicality (perspective dependence) in face emoji*

- a. sue impressed ann 😡
 ↪ {^{OK}**the author** / ?#Sue / ?#Ann} is/was angry
- b. sue admired ann 😊
 ↪ {^{OK}**the author** / #Sue / ?#Ann} is/was angry

(34) *anaphoricity in activity emoji*

- a. sue impressed ann 🏀
 ↪ {#the author / ^{OK}**Sue** / #Ann} plays/played basketball
- b. sue admired ann 🏀
 ↪ {#the author / ?#Sue / ^{OK}**Ann**} plays/played basketball

This suggests that when there is no plausible experiencer argument available, the default author orientation (1st-person indexicality) emerges. An author orientation also shows up in Kaiser & Grosz’ (2021) experiment in contexts with transfer verbs (e.g. *brought*), which do not have an experiencer argument: Here, face emoji exhibit a significant preference for an author interpretation in examples like (35). This is expected, as this is the default resolution preference for face emoji.

(35) abigail brought dessert to emily 😊
 ↪ *preferred interpretation*: The author is the attitude holder for the emoji 😊

We conclude that the attitude holder of face emoji is often the author, but it can shift to a potential attitude holder mentioned in the text if such an association is plausible, e.g. if the referent is the experiencer of a psych predicate that semantically does not conflict with the emoji’s meaning. These findings are compatible with an analysis of face emoji as expressives, given that expressives have been argued to shift away from the speaker (Amaral et al. 2007), though they do so under highly constrained conditions (Harris & Potts 2009).

3.3 Face emoji and scope

In Section 2.3, we discussed the projective properties of activity emoji and showed that discourse relations play a key role. However, under our analysis, discourse relations are not relevant for face emoji to the same extent, because, as we saw in Section 3.1, they are not integrated with the text via discourse relations, but instead comment directly on the text. In what follows, we analyze the projective properties of face emoji separately from those of activity emoji.

Face emoji are the plausible online counterpart of facial expressions. Taking this as our point of departure, we note that Schlenker (2018: 313–314) argues that co-speech facial expressions, like co-speech gestures, can trigger co-suppositions. In the constructed example in (36) (from Schlenker 2018: 313) a disgusted facial expression co-occurs with the verb phrase *skiing with his parents*. Schlenker argues that this facial expression falls under the scope of the negation *won't*, thereby giving rise to the conditional presupposition that *for Sam to go skiing would be disgusting*, from either the speaker's or Sam's perspective (Schlenker remains neutral on the issue).

- (36) Sam won't go [skiing with his parents] + **DISGUST**
 ↷ For Sam to go skiing with his parents would be disgusting (from the perspective of the speaker/from Sam's perspective)

Unlike co-speech facial expressions, (36), face emoji seem to be preferably interpreted as scoping over the accompanying text, as shown in (37), which is constructed to be maximally similar to Schlenker's example. Following our analysis in Section 3.1, we can interpret the nauseated face 🤢 in the constructed example (37a) as negatively evaluating the entire clause²¹, (37b), therefore scoping outside the negation (see also Schlenker 2018: 344). By contrast, the reading in (37c), in which the emoji takes scope below the negation, seems to be unavailable (though emoji users' intuitions on the availability of (37c) are far from clear, compared to the uncontroversial availability of (37b)).

- (37) a. Sam won't go skiing with his parents 🤢
 b. ↷ It's disgusting (for the author) that Sam won't go skiing with his parents
 c. ↷ ? For Sam to go skiing with his parents would be disgusting (from the perspective of the author/from Sam's perspective)

A core difference between facial expressions and face emoji has to do with their modality. Facial expressions are in a different modality from speech (one is visual, one mostly auditory) and can thus potentially overlap/co-occur with speech. However, face emoji and text are both written

²¹ An anonymous reviewer points out that relevant inferences can be based on a range of different aspects of the text; e.g., in an example such as (vii), where the reason for Sam not being able to go skiing cannot be blamed on Sam, the emoji can target the reason, rather than the main clause.

(vii) They scheduled the exam close to the holidays. Sam couldn't go skiing with his parents 🤢

and thus have to be linearized relative to each other (they cannot overlap). It could be this fundamental difference that gives rise to the contrast between (36) and (37).

This is not to say that face emoji are completely unable to give rise to readings of the type observed in (36). While we emphasize that additional careful empirical work is needed to further elucidate these behaviors of face emoji, we review two candidate constructions in the following sections: cases where face emoji may scope below negation when the most salient reading (under which they scope outside negation) is infelicitous and thus disfavored (Section 3.3.1) and cases where emoji repetition is used as a scope-marking device (Section 3.3.2).

3.3.1 Face emoji that scope below negation when the most salient reading is disfavored

A revealing contrast is found in (38), where the choice of subject (*Sam* vs. *I*) seems to affect the available readings. (38a) is parallel to (37) in that the face emoji scopes over the entire proposition. (We include two variants, (38a-i) and (38a-ii), to show that the pattern generalizes.) By contrast, (38b) seems to allow for (and even prefer) a ‘local scope’ reading, similar to the ones observed by Schlenker’s (2018) in (36).^{22,23} The availability of such a ‘local scope’ reading in (38b) plausibly derives from the pragmatic infelicity of the ‘global scope’ reading, i.e., of communicating that one’s own preferences are disgusting (i.e. ??*it is disgusting that I don’t want to sing at the party tonight*), which leads to the more salient ‘global scope’ reading being disfavored in (38b).²⁴

- (38) a. *Context*: Sam is expected to sing at the party, but does not want to.
- i. Sam won’t be singing at the party tonight 🤢
 - ii. Sam doesn’t want to sing at the party tonight 🤢
- preferred reading*: it is disgusting [that Sam won’t sing at the party tonight]

²² These observations don’t seem to be limited to face emoji, but carry over to other affective emoji as well, as shown by (viii) and (ix).

(viii) *Context*: Sam is expected to sing at the party, but does not want to.

Sam won’t sing at the party tonight 🤢

→ I dislike *that Sam won’t sing at the party tonight*

(ix) *Context*: I am expected to sing at the party, but do not want to.

I won’t sing at the party tonight 🤢

→ I (would) dislike *singing at the party tonight*

²³ An anonymous reviewer finds the local reading to be emphatically available in (38a) if it is *Sam* who would find singing at the party disgusting. For (38a), such a local reading was found to be unavailable in our own evaluation/data collection; moreover, it is an unlikely reading in light of Kaiser & Grosz (2021) as it would require attitude holder shift in the absence of a psych predicate. That being said, the availability of such a reading would not challenge our account for when local readings arise.

²⁴ The attestation of examples with ‘local scope,’ such as (38b), does not commit us to Schlenker’s co-suppositional explanation of these inferences, as the obtained reading is compatible with an analysis where the face emoji negatively evaluates the event description *singing at the party*; to express such an evaluation, the face emoji itself would not need to be in the scope of negation.

- b. *Context:* I am expected to sing at the party, but do not want to.
- i. I won't be singing at the party tonight 🙄
 - ii. I don't want to sing at the party tonight 🙄
- preferred reading:* [singing at the party] is/would be disgusting
(~ for me to sing at the party would be disgusting)

3.3.2 Face-emoji repetition that serves as a scope-marking device

The general tendency seems to be to interpret both face and affective emoji outside of the scope of the negation, as in (37a)/(38a) vs. (36). In addition to possible exceptions that arise from pragmatic constraints, (38b), we proceed to consider one other type of construction in which face emoji appear to scope below negation. When the same face emoji is repeated throughout a part of a sentence that the emoji is meant to comment on, the emoji-repetition could potentially be interpreted as a scope marking device, indicating an intended scope of the emoji that falls under the scope of negation, with an interpretive behavior similar to the facial expression in (36).

The possibility of repeating emoji throughout a message was first documented, to our knowledge, by Tatman (2017), for the clapping hands emoji (👏) and the US flag (🇺🇸); Gawne & McCulloch (2019: 11) call such uses *beat-related*, which is the term that we will use.²⁵ Beat-related uses of face emoji are attested on social media platforms such as Twitter, with examples dating back to as early as 2011. Naturalistic examples of beat-related face emoji are given in (39a) and (40a). As indicated in (39b-c) and (40b-c), the repetitions of 🙄 and 🙄 seem to have scope marking properties; the repeated use of these emoji seems to boost the interpretations (39b) and (40b), in which the emoji evaluate the properties “cooking with an oven” and “cooperating with me lately,” respectively. By contrast, the readings in (39c) and (40c), in which the emoji are interpreted as commenting on the entire clause, appear to be less salient and perhaps even unavailable. It is also worth noting that a more “compositional” reading of these examples in which each repeated emoji targets only the word that precedes it (e.g., in (39), the speaker would be conveying disgust towards *cook*, and *with*, and *an*, and *oven*), is unavailable.

- (39) a. I can't believe before I had an air fryer I used to cook 🙄 with 🙄 an 🙄 oven 🙄 [twitter]
 b. ~ Cooking with an oven is disgusting (for the author)
 c. ➔ It's disgusting that I can't believe this (“that before I had an air fryer...”)
- (40) a. I don't know why my bangs just won't 🙄 cooperate 🙄 with 🙄 me 🙄 lately 🙄 [twitter]
 b. ~ It's upsetting that my bangs won't cooperate with me lately
 c. ➔ It's upsetting that I don't know this (“why my bangs...”)

²⁵ A representative example from Gawne & McCulloch (2019) is cited in (x).

(x) WHAT 🙄 ARE 🙄 YOU 🙄 DOING 🙄

From a big-picture perspective on visual communication, beat-related face emoji could be an innovative means to overcome the *non-durativity* of the digital medium, i.e., the problem that emoji must be linearized in the same modality as the accompanying text, and cannot co-occur with the text. The beat-related repetition may mimic co-occurrence of emoji and text, thus mimicking the simultaneity in the durative case between facial expressions and speech.

We may thus suspect that a ‘local scope’ reading for (38a) should become more readily available if the emoji is repeated, as in (41). Initial intuitions suggest that this may indeed be the case; however, the idea that beat-related uses of face emoji have scope-marking properties is at a theoretical stage, and needs further empirical evaluation.²⁶ If it turns out to be on the right track, beat-related uses would be an interesting user-driven way in which the expressive power of face emoji can be enriched, by indicating that the face emoji are scopally embedded in the accompanying text.

- (41) Sam won’t be 🎤 singing 🎤 at 🎤 the 🎤 party 🎤 tonight 🎤
 ~> (*expected:*) for Sam to sing at the party would be disgusting

4 Discussion

In this paper, we argued for an initial semantic typology of emoji that draws a distinction between activity emoji (🎸, 🎤, 🎧) and face emoji (😄, 😊, 😊). We argued that both types of emoji are connected to an individual that functions as the agent (for activity emoji) or attitude holder (for face emoji), respectively — this connection may be encoded in the semantics or arise in the pragmatics, as we will discuss briefly in Sections 4.1–4.3. However, the two types of emoji differ as follows. Activity emoji largely behave like event-denoting free adjuncts with anaphoric properties; i.e. they anaphorically pick up an individual that serves as the agent or other core participant in the denoted eventuality. By contrast, face emoji incorporate the type of perspective sensitivity (and thus 1st person indexicality) commonly found with expressives; they typically pick up the author as the attitude holder, though there are shifted cases where face emoji pick up an experiencer introduced by a psych predicate — provided that the psych predicate and the emoji match in valence.

With regards to scopal behavior, we argued that most emoji (regardless of whether they are activity emoji or face emoji) scope outside of the text that accompanies them, by virtue of which they scope over negation (and presumably other logical operators) in the text. The exception for activity emoji seems to be *Elaboration* cases, where the emoji further specify an eventuality described in the text, thus creating the appearance of scoping below negation. For face emoji, exceptions may be licensed for pragmatic reasons (if the preferred reading is infelicitous) or due

²⁶ Notably, such local scope readings may be marked, and may not be accessible to all emoji users, due to the novelty and relatively low frequency of beat-related uses of face emoji.

to beat-related repetition. We leave open whether there are true cases of emoji scoping below negation (giving rise to projective inferences), or whether scope interactions are merely illusory.

Before we conclude, we briefly consider current approaches to the lexical entries of emoji. There are (at least) three possible approaches to formalizing the lexical entries of emoji: lexicalist (convention-based) approaches, pictorial (picture-based) approaches, and hybrid approaches that incorporate aspects of both. A decision between these three approaches is orthogonal to our proposal in this paper, which is compatible with all three. Thus, the distinction that we propose in this paper between the semantic properties of face emoji and activity emoji needs to be acknowledged regardless of whether one assumes a lexicalist or a pictorial approach.

4.1 A lexicalist (convention-based) approach

Adopting a term from Maier (2021), *lexicalist* approaches to the meanings of emoji assume a relatively rich semantics for face emoji, as given in (42) for 😡 and 😞.²⁷ Under such a view, the lexical entry of the emoji specifies general properties of the emoji type, such as the presence of an attitude holder (*author_o* in (42a-b)), but also more specific aspects of a given emoji, such as the particular emotion that a face emoji encodes (here: *angry* vs. *moderately sad*). The analysis in (42a-b) is purely *symbolic* (convention-based) in that it does not account for the *iconic* (resemblance-based) nature of emoji; we return to this issue in Section 4.3, after reviewing a purely iconic, picture-based approach in Section 4.2.

(42) *Symbolic Semantics for Face Emoji*

- a. $\llbracket \text{😡} \rrbracket^s(p)$ iff $g(\text{author}_o)$ feels **angry** about p in $g(w_o)$
- b. $\llbracket \text{😞} \rrbracket^s(p)$ iff $g(\text{author}_o)$ feels **moderately sad** about p in $g(w_o)$

Note that there are various ways of fleshing out a symbolic semantics; while (42a-b) uses English emotion terms (*angry* and *moderately sad*) in the meta language, the denotations could be defined more abstractly, e.g. in terms of their valence and arousal properties on a numerical scale (see Russell 1980, Jaeger et al. 2019). These issues are beyond the scope and aims of the current paper, but are an important avenue for future work.

While we did not posit concrete lexical entries for activity emoji in Section 2, a symbolic semantics can be given for activity emoji in the same way in which (42) outlines a symbolic semantics for face emoji. To illustrate, the lexical entry of a football emoji may specify a football-playing event, and also include a contextually given agent argument, represented by a contextually assigned variable $g(1)$ in (43a). While (43a) is motivated by the anaphoricity of activity emoji, it is far from clear that all aspects of the rich lexical entry (43a) are part of the emoji's semantics.

²⁷ These entries are based on the meaning descriptions on *Emojipedia*; 😞 is described as 'moderately sad' in comparison to 😞, which expresses more intense sadness/grief.

The more minimal (43b) assumes that the presence of an agent is pragmatically inferred from the properties of football-playing events. Even more minimally, (43b) may actually derive from (43c) by virtue of event coercion.

(43) *Symbolic Semantics for Activity Emoji (three alternative analyses):*

- a. $[[\text{⚽}]]^g = \{e \mid e \text{ is a football-playing eventuality \& } g(1) \text{ is the agent of } e\}$
- b. $[[\text{⚽}]] = \{e \mid e \text{ is a football-playing eventuality}\}$
- c. $[[\text{⚽}]] = \{x \mid x \text{ is a football}\}$

It is beyond our scope to adjudicate between the alternatives in (43a-c); a compelling point for (43c) may emerge from the coexistence of “bicycle” (🚲) and “person biking” (🚴) — if future empirical investigation can demonstrate that they pattern differently along the lines of an object-vs-event distinction, mapping onto (44). (An orthogonal open question is whether 🚴 denotes the biking activity, (44b), or its agent, as suggested by the emoji’s Unicode name.)

- (44)
- a. $[[\text{🚲}]] = \{x \mid x \text{ is a bicycle}\}$
 - b. $[[\text{🚴}]] = \{e \mid e \text{ is a biking eventuality}\}$

Concluding this section, we wish to emphasize that the difference in how face emoji are modeled as propositional operators, (42), and activity emoji as event descriptions, (43a-b), is not coincidental; it captures the fundamental difference between these emoji types: face emoji *operate on* a contextually given proposition p , whereas activity emoji denote event descriptions.

4.2 An iconic (picture-based) approach: Maier (2021)


Symbolic approaches of the type outlined in Section 4.1 contrast with radically minimalist iconic approaches to emoji semantics, as proposed by Maier (2021), who argues for an explicitly *pictorial* account: emoji are simply ‘little pictures’. His analysis of face emoji is summarized in (45); this view does not include reference to the author or to emotional attitudes within the lexical entry. The author-orientation emerges from the assumption that face emoji are interpreted with regards to a viewpoint v_c that typically faces the author of the message. In other words, if an author types ‘it’s raining 🌧️’, then the message communicates that the author looks like the picture 🤔 while typing the message ‘it’s raining’. A pictorial semantics thus assigns more aspects of the meaning to the pragmatics than a lexicalist semantics.



(45) *Pictorial Semantics for Face Emoji (based on Maier 2021)*

- a. For any face emoji 🟡 (“large yellow circle” as a place-holder for face emoji):
 $[[\text{🟡}]]^{\Pi} = \{c \mid \Pi(w_c, v_c) = \text{🟡}\}$
- b. In words: ‘the picture 🟡 describes an utterance context c where a part of the world w_c as observed from canonical viewpoint v_c via a stylized projection Π looks like 🟡’


Similarly, Maier proposes an analysis of non-face emoji that is summarized in (46).

(46) *Pictorial Semantics for Non-Face Emoji* (based on Maier 2021)

- a. For any non-face emoji :

$$\llbracket \text{img} \rrbracket^{\Pi} = \{w \mid \exists v. \Pi(w, v) = \text{img}\}$$
- b. In words: ‘the picture  describes a proposition that there is a viewpoint v somewhere in space and time from where the world w looks like  modulo a stylized projection Π ’

In Maier’s approach, the issue of perspective dependence (1st person indexicality), which we discussed in Section 3, would be tied to the contextually provided indexical viewpoint variable v_c , which would have to face the author by default, but would need to allow for shifting towards a non-author attitude holder in suitable contexts. Similarly, the issue of anaphoricity that we discussed in Section 2 would build on pragmatic enrichment of the semantics in (46) when it involves a picture that connects to an activity or property.






Broadly speaking, a pictorial semantics is extremely minimal and thus requires less assumptions than a lexicalist approach. At the same time, there is ample anecdotal evidence for conventionalization in emoji use, which necessarily goes beyond a purely pictorial interpretation of the emoji: an example is the ‘weary face’ emoji , which has been observed to “convey various feelings of frustration, sadness, amusement, and affection” (*Emojipedia*).²⁸ Positive interpretations frequently occur in contexts where something is considered cute, (47).

(47) the idea of severus owning a cat is so cute  [twitter]

The positive interpretations of the ‘weary face’ do not follow from its resemblance to corresponding facial expressions, which are exclusively negative (see Fugate & Franco 2021).

4.3 A hybrid approach: lexicalism with iconicity

Notably, in the domain of lexicalist approaches, there are at least two options worth considering. Building on Greenberg (2021), we observe that emoji may be symbolic, as discussed in Section 4.1, but emoji may also have convention-based lexical entries that *incorporate* iconicity. A hybrid lexical entry that incorporates iconicity into a convention-based lexical entry is given in (48) for face emoji, and in (50) for activity emoji.

Developing an iconic semantics in the spirit of Greenberg (2021), we may capture all face emoji with a single lexical entry, as sketched in (48). To unpack this analysis, we arbitrarily pick  as a place-holder for all face emoji, i.e.  stands for {, , , ...}. Greenberg’s (2021) idea is that a lexical entry for a given sign is iconic if the form of the meaning-bearing object also

²⁸ <https://emojipedia.org/weary-face/> (Last accessed on 2 January 2023.)

occurs in its denotation. In (48), this means that 🟡 occurs both to the left and to the right of the *iff* connective.

(48) *Iconic Lexicalist Semantics for Face Emoji*

For any face emoji 🟡 ('yellow circle' as a **place-holder** for face emoji)

$\llbracket \text{🟡} \rrbracket^s(p)$ iff $g(\text{author}_0)$ has an emotional attitude towards p in $g(w_0)$ that corresponds to a facial expression that resembles 🟡

If we substitute any face emoji for 🟡 in (48), we get a well-formed lexical entry, two of which are given in (49a–b). The iconic semantics in (48) is *rule-like* in that a lexicon of face emoji does not need to store (49a) or (49b); they simply derive from the more general (48). Crucially, such a hybrid approach, which builds iconicity into a lexicalist view, eschews the semantic minimalism of a purely pictorial approach of the type that we saw in Section 4.2. The lexical entries in (48) and (49) still encode the attitude holder, a target proposition p and the presence of an emotional attitude with regards to this p , all of which go beyond a picture of a facial expression.

(49) a. $\llbracket \text{😄} \rrbracket^s(p)$ iff $g(\text{author}_0)$ has an emotional attitude towards p in $g(w_0)$ that corresponds to a facial expression that resembles 😄

b. $\llbracket \text{😞} \rrbracket^s(p)$ iff $g(\text{author}_0)$ has an emotional attitude towards p in $g(w_0)$ that corresponds to a facial expression that resembles 😞

The present paper does not aim to argue for one approach over the other, and we leave it as an open question whether a lexicalist view has more explanatory power, or a pictorial view, and to what extent iconicity should be incorporated into the meanings of emoji. At this point, our main goal is to highlight the differences between face emoji and activity emoji; we hope that this work can provide a foundation for future work regarding the choice of iconic vs. symbolic approaches to emoji semantics.

Having considered a hybrid lexicalist approach with iconicity for face emoji, (48), a hybrid analysis of activity emoji is given in (50) (with caveats relating to the distinction of object- and activity-depicting emoji, e.g. 🚲/🏍️, as discussed in Section 4.1).

(50) *Iconic Lexicalist Semantics for Activity Emoji:*

For any activity emoji 🌟: $\llbracket \text{🌟} \rrbracket = \{e \mid e \text{ is an } \text{🌟}\text{-based eventuality}\}$

To exemplify how (50) derives the meanings of different activity emoji, (51) derives from (50) by substituting the football emoji ⚽ for the place holder.

(51) $\llbracket \text{⚽} \rrbracket = \{e \mid e \text{ is a } \text{⚽}\text{-based eventuality}\}$

As with symbolic lexical entries (Section 4.1), it is an empirical question of how minimal or enriched a hybrid lexical entry should be; (51) would correspond to (43b), but generalized

lexical entries that generate counterparts of the richer (43a) or the more minimal (43c) are straightforward, as sketched in (52a) and (52b), respectively.

- (52) For any activity emoji 🏃:
- a. $\llbracket \text{🏃} \rrbracket^g = \{e \mid e \text{ is an } \text{🏃}\text{-based eventuality \& } g(1) \text{ is the agent of } e\}$
 - b. $\llbracket \text{🏃} \rrbracket = \{x \mid x \text{ is an } \text{🏃}\}$

With more minimal lexical entries, (50) and (52b), the existence of a discourse referent associated with the agent of the emoji-based event would be pragmatically inferred, similar to what Maier (2021) assumes in his pictorial approach, whereas it would be semantically encoded in (52a). It is an important empirical question for future research how rich the lexical entries are that emoji users command. Each of the alternatives in Sections 4.1–4.3 are compatible with our proposal.

4.4 Conclusions

In this paper, using a variety of data sources — introspective intuitions, naturalistic Twitter examples, and experimental evidence — we propose a classification of emoji-text combinations, focusing on face emoji and activity emoji. Extending observations from prior linguistic work to a new domain, we show that these two emoji types differ in their semantic properties: face emoji exhibit perspective dependence while activity emoji exhibit discourse anaphoricity. Consequently, these two emoji types are resolved in different ways. Specifically, we analyze *face emoji* as expressive elements that are anchored to an attitude holder and comment on a proposition in the accompanying text: they share the perspective dependence of natural language expressives, with a preference for first-person indexicality. We analyze *activity emoji* essentially as event descriptions that serve as separate discourse units (similar to free adjuncts) and connect to the accompanying text by virtue of suitable discourse relations. We provide further evidence for the distinct behavior of face emoji and activity emoji, in particular the role of discourse relations in the case of activity emoji, by looking at their scopal behavior with respect to linguistically-expressed negation. As a whole, this work identifies two semantically distinct subtypes of emoji that interact with linguistic material in distinct ways, and can provide a foundation for future investigations of emoji semantics and the interplay between linguistic expressions and emoji.

Ethics and consent

For the collection and analysis of naturally occurring examples on Twitter, the study obtained approval from the Norwegian Centre for Research Data (NSD), reference number 414881.

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Competing interests

The authors have no competing interests to declare.

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