Emojis and conditionals: Exploring the super linguistic interplay of pictorial modifiers and conditional meaning

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Abstract: In recent years, formal linguistic analysis has expanded its scope to include objects of study *beyond* natural language, under the umbrella of *Super Linguistics* (intending the Latinate meaning of *super*, namely 'beyond'), see Patel-Grosz, Mascarenhas, Chemla and Schlenker (forthcoming). One super linguistic object of study are emojis, which can be analyzed as digital counterparts of gestures and facial expressions, but which also share properties with natural language expressions such as *alas* and *unfortunately* (Grosz, Greenberg, De Leon and Kaiser 2021b). In this paper, I use conditionals as a case study to argue that natural language semantics can benefit from a study of emoji semantics. I start by arguing that face emojis (disk-shaped pictographs with stylized facial expressions) operate on contextually salient propositions. I show that they can comment on the presuppositions of *wh*-questions and definite descriptions, but not on conversational implicatures. I then show that face emojis can also comment on the counterfactual inferences of subjunctive conditionals (or, more broadly, subjunctive *if*-clauses). This suggests that these counterfactual inferences may be presupposition-like and not, as widely assumed, an instance of implicature (cf. Zakkou 2019 for recent discussion). The study of emojis, a non-standard object for linguistic inquiry, can thus directly inform more traditional linguistic exploration.

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1 Introduction

Emojis (😉,🏀,🌲) are pictographs that have become common place in written digital communication since they were first introduced to an international market in 2011.[1] The increasing popularity of emojis can be connected to the drastic increase of written online text in everyday communicative exchanges, in the form of blog posts, social media posts, emails, live chats, or via messaging apps. Written text lacks the multimodal features of face-to-face communication, such as facial expressions (see e.g. Russell and Fernández-Dols 1997), gestures (see e.g. Abner, Cooperrider and Goldin-Meadow 2015), or intonation (see e.g. Pierrehumbert and Hirschberg 1990); emojis are plausibly a means of re-introducing this multimodality into the written text.[2] Correspondingly, in theoretical linguistics, a view has emerged where emojis are the digital counterparts of gestures and facial expressions, as advocated, for instance, by Gawne and McCulloch (2019), Pasternak and Tieu (2021), Pierini (2021), or Grosz, Kaiser and Pierini (2021a). This paper builds on recent research on the formal semantic analysis of emojis, and discusses ways in which the study of natural language expressions can be informed by the study of emojis. The focus is on face emojis (😀,😦), defined as disk-shaped pictographs with stylized facial expressions, and how they are interpreted in connection with natural language conditionals. An emoji-conditional combination is illustrated in (1). Here, the emoji seems to communicate that the author is unhappy about the rain and how it affected plans for the beach.

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[1] See, e.g., Bai, Dan, Mu and Yang (2019) for a representative review of research on emojis.
[2] Other means of reintroducing multimodality include typographical features such as bold type or capitalization (e.g., Scott and Jackson 2020), as well as punctuation marks (e.g., Dresner and Herring 2010:253).

(1)   If it hadn't been raining, we would have gone to the beach 😦

Section 2 presents the general framework, and Section 3 its application to conditionals.[3] The empirical exploration in Section 3 argues that emojis that follow conditionals can comment on the counterfactual inference of subjunctive conditionals, which is argued to suggest that these are presupposition-like inferences rather than conversational implicatures.

2   Outline of a formal semantics of face emojis

2.1   Emojis as emotive markers of non-at-issue evaluation

In recent formal semantic approaches to the meaning of emojis, Grosz et al. (2021a) and Kaiser and Grosz (2021) argue that face emojis should be analyzed as expressive modifiers; see, e.g., Potts (2007) and Gutzmann (2013). In related work, Grosz, Greenberg, De Leon and Kaiser (2021b) propose a formal semantic analysis (summarized in Section 2.2) that compares face emojis to the emotive markers of Rett (2021). Rett (2021:307) defines an *emotive marker* "as a morpheme, syntax, or prosody that encodes the speaker's emotive attitude towards some proposition made salient by the utterance in which it occurs, and does so in backgrounded, not-at-issue content". She focuses on the English words *alas* and *unfortunately*, but also includes exclamation intonation and mirative markers in various languages. The parallels between emojis and Rett's *unfortunately* are illustrated in (2), where A1, B and C are cited from Rett (2021:309), and A2 has been added as a modification of A1. A speaker who utters A1 conveys both that Jane lost and that this is saddening. As shown in B, the first of these two inferences can be directly denied. By contrast, C shows that the second inference cannot be directly denied. The judgments for B and C remain exactly the same if we change A1 to A2.[4]

(2)   A1:   Unfortunately, Jane lost the race.
       A2:   Jane lost the race 😔
       B: That's not true, she won!
       C: # That's not true, you're glad she did!

Importantly, we also find differences between emojis and *alas/unfortunately*, suggesting that emojis are related to Rett's emotive markers, but not subsumed by them. As shown in (3a), *alas/unfortunately* cannot combine with an imperative, but emojis do not exhibit such a restriction; (3b) is entirely well-formed and may convey a certain level of resignation, e.g. concerning the author's expectation of whether the addressee will actually carry out the requested action; alternatively, the emoji may comment on the presupposition that the room has not been cleaned (see Section 2.3.1 on emojis that comment on presuppositions).

(3)   a.   #Alas/#Unfortunately, clean up your room!   (Rett 2021:320)
       b.   Clean up your room 😔

As an additional data point, (4) shows that face emoji are also acceptable in connection with *wh*-questions, which further sets them apart from Rett's (2021) emotive marker *unfortunately*. Rett (2021:318) argues that such emotive markers only occur with *wh*-questions that make a single proposition salient, which explains why they are unacceptable in (5a). Interestingly,

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[3] The observations on the interaction of emojis with conditionals and with (biased) questions (see footnote 5) build on conversations with Christian De Leon, Gabriel Greenberg and Elsi Kaiser.
[4] Prior work shows that emoji users have reliable introspective intuitions on emoji use, which can be confirmed in controlled experiments, as demonstrated by Kaiser and Grosz (2021) for the intuitions in Grosz et al. (2021a).

though, *alas* differs from *unfortunately* in being quite acceptable in (5b). This indicates that emojis are more similar to *alas* than *unfortunately* (as also suggested by Grosz et al. 2021b).

(4)   What's that noise? 🙁

(5)   a. # Unfortunately, what's that noise?   /   # What's that noise, unfortunately?
        b. Alas, what's that noise?   /   What's that noise, alas?

2.2   Emojis as propositional operators

Grosz et al. (2021b) present an analysis of face emojis as a type of expressive modifier (see also Grosz et al. 2021a, Maier 2021), summarized in (6b) and (7b). Here, (6a) and (7a) are two different direct messaging exchanges that could occur in exactly the same context, and which only differ in the information available to B. The analysis of Grosz et al. (2021b) has two core components: face emojis comment on a salient proposition p, which is anaphorically retrieved from the immediate linguistic context (typically from the preceding sentence), (6d) and (7d). The emojis comment on p in relation to a contextually provided discourse value V, a proposition that represents the author's desires, aspirations, wishes or hopes, (6c) and (7c). The interplay between p and V accounts for the observation that face emojis with contradictory valence (😊 vs. 😔) can be used in regards to the same proposition, as in (6ad) and (7ad), in light of additional contextual information.

(6)   a. A: you must be starving
            B: i've already eaten 😊
        b. ⟦😊⟧ = λxλpλV . {w | x is happy about how p bears on V at w }
        c. V = the author is sated
        d. p = the author has already eaten   (p contextually entails V)

(7)   a. A: i made your favorite food
            B: i've already eaten 😔
        b. ⟦😔⟧ = λxλpλV . {w | x is unhappy about how p bears on V at w}
        c. V = the author eats their favorite food
        d. p = the author has already eaten   (p contextually entails ~V)

For the purposes of the present paper, the connection to discourse values is less central than the fact that face emojis comment on a proposition p which they access through an anaphoric relation. In Section 2.3, I show how we can *repurpose* this property of face emojis as a tool to diagnose the status of salient propositions, e.g., whether they are presuppositions or implicatures of the preceding text.

2.3   Targets of face emojis – presuppositions *vs.* implicatures

2.3.1   Face emojis can target presuppositions

Emojis often comment on the proposition expressed by the accompanying text, as in (6) and (7), but this is not always the case. Grosz et al. (2021b:9) document that emojis can also comment on presuppositions of the accompanying text. This is particularly visible with *wh*-questions: in (8a) (from Grosz et al. 2021b:9), the emoji appears to comment on the existential presupposition, (8b), rather than, say, an expected answer, (8c), which may be a

possible reading in its own right.[5] (Here, '✓' marks the prominent reading, '(✓)' a less prominent one.)

(8) a. Who drank my coffee? 😦

    b. *presupposition-targeting reading:*

      ✓   I'm unhappy that p = *somebody drank my coffee*

    c. *answer-targeting reading:*

      (✓) I'm unhappy that p = *I expect that the answer will be unpleasant*

Another type of presupposition that emojis can target is plausibly the existential presupposition of definite descriptions. This is shown in (9a), where the emoji seems to comment on the existential presupposition of *the evidence*, (9b),[6] rather than on the asserted content of the preceding text, (9c).

(9) a. I long thought that there was no evidence in this case, and I was about to give up.
      The evidence was in the trash can 😀

    b. *presupposition-targeting reading:*

      ✓   I'm happy that p = *there is evidence*

    c. *assertion-targeting reading:*

      (✓) I'm happy that p = *the evidence was in the trash can*

2.3.2 Face emojis fail to target conversational implicatures

Importantly, there are limits when it comes to the potential targets of emojis, i.e., they cannot simply target any proposition that is inferable in the context. Specifically, emojis don't standardly target conversational implicatures. We see this for scalar implicatures (see, e.g., Chierchia, Fox and Spector 2012) in ($10A_1$), where the sad face ('😦') seems to be deviant.[7],[8] If the emoji could freely target the *some-but-not-all* implicature in A_1, it should be as

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[5] In biased yes/no-questions (see, e.g., Ladd 1981, Büring and Gunlogson 2000, Romero and Han 2004, Romero 2006, Krifka 2017:360), emojis can comment on the expected answer, but not on its opposite, which explains the acceptability of the unhappy face emoji in (ii), and the happy face emoji in (iii).

i.   Context: The author only eats at vegetarian restaurants; the author is currently looking for a place to eat.

ii.   Is there no vegetarian restaurant around here? 😦 / #😀

       ⤳   I'm unhappy that p = *I expect that there is no vegetarian restaurant*

iii.   Isn't there some vegetarian restaurant around here? 😀 / ?#😦

       ⤳   I'm happy that p = *I expect that there is a vegetarian restaurant*

[6] Examples of this type raise interesting questions about the nuances associated with different face emojis. An anonymous reviewer asks if the choice of emoji in (9a) (the 'grinning face' 😀 instead of the 'smiling face with smiling eyes' 😊) indicates that the author is not commenting on the presupposition *there is evidence*, but rather expressing amusement along the lines of *it is funny that the evidence was in the trash can*. In this paper, I generally use the emojis that seem most natural in a given example; that being said, as far as I can tell, the variant with 😊, given in (i.), is as acceptable as (9a) and less compatible with an amusement-expressing reading, thus strongly favoring the reading in (9b).

i.   I long thought that there was no evidence in this case, and I was about to give up.

      The evidence was in the trash can 😊

[7] The intended reading of ($10A_1$) is one that does not involve irony or sarcasm, which can improve otherwise deviant examples such as (i) (see also Giustolisi and Panzeri 2021):   i.   The party was great 😦

[8] An anonymous reviewer points out that the sad face in ($10A_1$) seems to improve if prosodic cues are added, such as stress on *some*. While I share this intuition, its interpretation is complicated by the fact that emojis only occur in written text, whereas prosody and stress are spoken language phenomena. Moreover, stress on *some* may involve the insertion of a covert *only* (see, e.g., Chierchia et al. 2012), which would make the example equivalent to ($10A_3$).

acceptable as the sad face in (10A$_2$/A$_3$). (See Grosz et al. 2021b on the effect of adding *only* to text with emojis.)

(10) Q: What was your garden like after the hail storm?
  A$_1$: Some of my plants survived. 😊 / #😟
  A$_2$: Some but not all of my plants survived. 😟
  A$_3$: Only some of my plants survived. 😟

A parallel point can be made for ignorance implicatures; example (11A$_1$) triggers an ignorance implicature very much alike to what is openly asserted in (11A$_2$). However, while the emoji in (11A$_2$) can convey "I'm sad [that I don't know exactly]", this is not possible in (11A$_1$), so the ignorance implicature of (11A$_1$) is not accessible to the emoji either.

(11) Q: Where does C live?
  A$_1$: Somewhere in the South of France #😟
  A$_2$: I don't know exactly 😟
  (modeled after Grice 1975:51)

3   Case study: face emojis and conditionals

3.1   Counterfactuality – presupposition or implicature?

Turning to our case study, conditionals, a central question in their semantic analysis concerns the inferences that are drawn from subjunctive mood marking in the antecedent clause. To set the scene, take (12a) as a representative past subjunctive conditional.[9] Simplifying significantly for the purpose of this paper, the entailment of (12a) can be stated as $p>q$, which is informally paraphrased in (12b) (ignoring tense). Crucially, (12a) gives rise to a counterfactual inference, (12c).

(12) a. If he had been late, he would have called us.   *past subjunctive conditional*
  b. $p>q$ ≈ in situations in which he is late, he calls us
  c. $\neg p$ ≈ he was not late   *strong counterfactual inference*

There is an ongoing debate on how to model the counterfactual inference (12c). At the very least, it could be a counterfactual presupposition or a counterfactual implicature (see, e.g., Portner 1992, von Fintel 1998, 1999, Ippolito 2003, 2007, Schlenker 2004, Schulz 2014, Arregui and Biezma 2016, Leahy 2011, 2018, Wimmer 2020, von Fintel and Iatridou 2020, among many others). Building on Anderson (1951) and Stalnaker (1975), the dominant view has long been that the counterfactual inference is an implicature as opposed to a presupposition. However, presuppositional analyses have occasionally been pursued, e.g., by Portner (1992) and Karawani (2014). Most recently, Zakkou (2019) argues that the arguments against the presupposition view are inconclusive, and that the presuppositional view – with a falsity presupposition as stated in (12c) – is a viable contender.

   Zakkou (2019:3) points out that her discussion only applies to past subjunctive conditionals, (12a), and that the facts may be different for non-past subjunctive conditionals, like (13a), for which she considers a presupposition view to be less plausible. However, she focuses on falsity inferences, and the 'counterfactual inference' may well be weaker in (13c)

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[9] The labels *subjunctive* and *counterfactual* have often been questioned as problematic in the literature on conditionals, most recently in von Fintel and Iatridou (2020), who propose the term *X-marked conditional* for constructions of the type in (12a). I use the term *subjunctive* in a loose informal sense, adopting the label *(non-) past subjunctive conditional* from Ippolito (2003).

(where it merely amounts to the unlikelihood of *p*) than in (12c) (where it amounts to the falsity of *p*). Such an asymmetry has been explicitly proposed, e.g., by Karawani (2014:167-172). In (13a-c), we may then also ask if *unlikelihood* is presupposed or implicated.

(13) a. If he were late, he would call us.   *non-past subjunctive conditional*
    b. *p>q*   ≈ in situations in which he is late, he calls us
    c. *unlikely(p)* ≈ he is not expected/likely to be late   *weak counterfactual inference*

In an attempt to shed new light on this question, we can now ask what happens if we add a face emoji to a conditional. Specifically, given that face emojis seem to target presuppositions, but not implicatures, we can ask if the face emoji can target the counterfactual inference. In what follows, I argue that face emojis can in fact target the counterfactual inference of subjunctive *if*-clauses (including conditionals); this suggests that such inferences are presupposition-like, and do not pattern like conversational implicatures.

3.2 Face emojis and negated subjunctive *if*-clauses

To see that face emojis can target the counterfactual inferences of subjunctive *if*-clauses (including conditionals), let us start by looking at negated counterfactuals. This is a reasonable strategy to pursue since negated counterfactuals can embed strong evaluative adverbs such as *unfortunately*, (14), in connection with a particularly strong falsity inference; see, e.g., Liu (2012) and Axel-Tober and Grosz (2013), pace Ernst (2009). Our study of face emojis can be informed by insights on such emotive markers due to their similar nature (see Section 2.1): since *unfortunately* in (14) can comment on the counterfactual inference ¬*p* (= *I ordered the tofu*), it is a reasonable strategy to ask if emojis can also access this inference.

(14)   If I had not **unfortunately** ordered the tofu, I would have loved this restaurant.

To begin with, consider example (15b), modeled after an example from Axel-Tober and Grosz (2013:6), and supplied with the context (15a). The context entails that *loving the restaurant* (the consequent proposition) would correspond to the author's desired outcome.

(15) a. Context: I ate at the new vegan restaurant in my neighborhood, hoping to love it. I ordered dumplings and summer rolls, which I liked, but I also ordered tofu, which I did not like.
    b. If I had not ordered the tofu, I would have loved this place.

If we add a face emoji to (15b), there are at least four propositions that the emoji could in principle target. First of all, the entire conditional *p>q* is informally paraphrased in (16a) (ignoring tense), and the counterfactual inference *φ* is given in (16b). Since (15b) is a past subjunctive conditional, the counterfactual inference amounts to a falsity inference, i.e. ¬p.

Due to conditional strengthening ('perfection') from [*p>q*] to [¬*p>*¬*q*] (see, e.g., Geis and Zwicky 1971), we can also include [¬*p>*¬*q*], in (16c). From a combination of (16b) and (16c), most readers of (15b) will also infer that ¬*q* is true, as spelled out in (16d), since ¬*q* follows from [¬*p>*¬*q*] ∧ ¬*p*. This means that ¬*q* is another conceivable target for an emoji.

(16) a. p>q: in non-tofu situations, I love this place
    b. φ (= ¬p):   I ordered the tofu (= *the counterfactual inference*)
    c. φ>ψ (= ¬p>¬q):   in tofu situations, I do not love this place (= '*perfection*')
    d. ψ (= ¬q):   I did not love this place

In terms of the author's values in (15a), only the proposition in (16a) would be positively evaluated, and thus compatible with 😀. The expectation that an author who utters (15b) would hold a positive attitude towards (16a) derives from a similarity-based analysis of counterfactual conditionals (Lewis 1973): if the counterfactual *non-tofu*-worlds that are most similar to the *actual* world are worlds in which the author loved the restaurant, then this implies that the author already liked the restaurant to a relatively high degree (i.e. the author *almost* loved it). The proposition in (16a) thus pragmatically conveys that the restaurant was quite good, which promotes the goal of loving the place (i.e., a discourse value *V = the author loves the place*). By contrast, all of (16b-d) are plausibly negatively evaluated, and thus compatible with 😟, as they demote the goal of loving the place.

A reader may wonder if the prejacent propositions in the antecedent (p = *I did not order the tofu*) or the consequent (q = *I loved this place*) could be further potential targets for a face emoji. This is highly unlikely, since these two propositions are inferred to be false, given that (16b) and (16d) are implied to be true, and positively/negatively evaluative face emojis (😀/😟) exhibit a factivity requirement. To see this, consider (17), which is non-factive, as shown by the two possible continuations in parentheses. If we add a happy face emoji that targets the embedded proposition,[10] the resulting reading is one where the author implies that Mel is coming to the party, illustrated in (18). In other words, the face emoji forces a factive inference; this would collide with the falsity of *p* and *q* in (15b).

(17) sam didn't say that mel was coming to the party
      (… but she is in fact coming / … and, indeed, she isn't coming)

(18) sam didn't say that mel was coming to the party 😀
      ↝ I am happy about the fact that Mel is (or will be) at the party

Let us now explore the patterns that we find when adding face emojis to (15b).

Since face emojis can generally target the entire proposition asserted by a preceding declarative (see Grosz et al. 2021b:9), we expect that a happy face emoji can be added to (15b) and target the *p>q* proposition (16a). This expectation is confirmed in in (19a), for which the most natural interpretation is given in (19b).[11]

(19) a. if I had not ordered the tofu, I would have loved this place 😀
      b. ↝ I am happy that *p>q* (= *in non-tofu situations, I love this place*)

More importantly, the addition of an unhappy face emoji is equally acceptable, (20a), though the effect is different. Now, the face emoji appears to comment on an inference that is distinct from the conditional *p>q*. The reading that is intuitively available is compatible with three competing analyses: the sad face emoji may comment on φ (20b), φ>ψ (20c) or ψ (20d).

(20) a. if I had not ordered the tofu, I would have loved this place 😟
      b. Analysis 1: ↝ I am unhappy that φ (= *I ordered the tofu*)
      c. Analysis 2: ↝ I am unhappy that φ>ψ (= *in tofu situations, I do not love this place*)

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[10] There is also an irrelevant reading where the emoji targets the main clause proposition, i.e., *that sam didn't say it*.

[11] Face emojis often have a reading where they comment on an individual referent rather than a proposition (see Grosz et al. 2021b:3 for discussion). This gives rise to an additional reading of (19a), where the emoji comments on *this place* and expresses that the author simply has a positive stance towards the restaurant. I am grateful to an anonymous reviewer for flagging this reading of (19a). This paper is only concerned with face emojis that comment on propositions.

d.   Analysis 3: ↝ I am unhappy that ψ (= *I did not love this place*)

Prior to looking at more data, we observe the following: if the emoji can comment on φ, in line with (20b), then this lends credence to the presuppositional analysis of counterfactuality, since we have established that emojis can comment on presuppositions (Section 2.3.1).[12]

However, we first need to rule out the option that the emoji can *only* comment on φ>ψ or on ψ, in line with (20c-d). It may initially seem difficult to decide between (20b), (20c) and (20d), as their pragmatic effects are roughly equivalent in context (15a). However, I argue that an analysis where the emoji comments on φ>ψ or ψ is less plausible to begin with than an analysis where the emoji comments on φ, for the following reason. While the φ inference is triggered by subjunctive marking, the proposition φ>ψ arises via conditional strengthening, which has been argued to be a conversational implicature (see, e.g., von Fintel 2001); based on our findings in Section 2.3.2, φ>ψ should thus not be a suitable target for an emoji. Crucially, ψ is a pragmatic inference that is derived from [φ>ψ]∧φ, and thus parasitic on conditional strengthening, which makes it an even less likely target. This favors (20b) over (20c-d), and we can tentatively conclude that face emojis that follow past subjunctive conditionals can target the counterfactual inference *φ (= ¬p)* of the antecedent *if*-clause as their propositional argument.

Naturalistic Twitter examples[13] provide direct evidence that face emojis can comment on the counterfactual inferences (*φ*) of subjunctive *if*-clauses, though the clearest examples to date involve subjunctive optatives, illustrated in (21ab). We can include such evidence, since the mechanism for modeling counterfactual inferences in optatives, (21), and conditionals, (20), has been argued to be the same (see, e.g., Grosz 2012). In line with (12c) and (13c), we can differentiate between a falsity inference in (21a) and an unlikelihood inference in (21b).

(21) a.   🙀🙀🙀 if only I hadn't moved 😦😦   [twitter]   *past subjunctive optative*
         ↝ I am unhappy [that **it is false that** I didn't move]

     b.   if only they weren't weirdos 😦   [twitter]   *non-past subjunctive optative*
         ↝ I am unhappy [that **it is unlikely that** they aren't weirdos]

Before we move on to non-negated subjunctive *if*-clauses in Section 3.3, it is worth showing that examples of the type in (19) and (20) can also be found in a naturalistic data source. The near-minimal pair in (22a) and (23a) is reproduced from Twitter. Here, too, the happy face emoji in (22a) can comment on the entire conditional, (22b).[14] By contrast, (23a) has a plausible interpretation where the emoji comments on the counterfactual inference, (23b), modeled as unlikelihood since we are dealing with a non-past subjunctive conditional.

(22) a.   I would buy it if I wasn't broke 😄   [twitter]

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[13] Twitter examples are marked with a [twitter] superscript. When citing social media text, questions relating to ethics and privacy arise (see, e.g., Ayers, Caputi, Nebeker and Dredze 2018, Tatman 2018). To provide anonymity, this paper omits user names and URLs, but keeps examples unmodified in order to preserve their linguistic integrity. The study obtained approval from the Norwegian Centre for Research Data (NSD), reference number 414881.

[14] Interestingly, the intuitions with regards to the meaning of (22a) stood out in that they were controversial among emoji users who were consulted, and they were also questioned by an anonymous reviewer. Several consultants report the intuition that the author of (22a) is actually laughing at the current situation, i.e., expressing gallows humor. While this is an interesting observation, it is not critical for the discussion in this paper, as the reading in (22b), implausible as it may be, is predicted to be possible under any approach.

     b. ↝ I am happy that *p>q (= in worlds in which I am not broke, I buy it)*

(23) a. I would totally buy this if I wasn't broke 😟   [twitter]

     b. ↝ I am unhappy that *unlikely(p) (= it is unlikely that I am not broke)*

3.3   Face emojis and non-negated subjunctive conditionals

Consider now a scenario where, in the restaurant context (15a), your friend sends the message in (24). Once again, we can list the candidate propositions in (25). The judgments with regards to (24) seem to generally reproduce those in Section 3.2 in that the sad face emoji can target the counterfactual inference (25b). (The reasoning for (20c-d) carries over to (25c-d)).

(24) If you had ordered the tempeh, you would have loved this place! 😟

(25) a. p>q: in tempeh situations, you love this place
     b. φ (= ¬p):   you did not order the tempeh (= *the counterfactual inference*)
     c. φ>ψ (= ¬p>¬q):   in non-tempeh situations, you do not love this place
     d. ψ (= ¬q): you did not love this place

Once again, naturalistic examples can be provided, as in (26), which show that face emojis can comment on the counterfactual inferences of non-negated subjunctive optatives.

(26) a. If only we had stopped 😟   [twitter]   *past subjunctive optative*
        ↝ I am unhappy [that **it is false that** we stopped]
     b. if only you knew. 😟💔   [twitter]   *non-past subjunctive optative*
        ↝ I am unhappy [that **it is unlikely that** you know]

To wrap up this discussion, (20)-(26) indicate that face emojis can target the counterfactual inferences of subjunctive *if*-clauses (including subjunctive conditionals). This corroborates a view where such counterfactual inferences are presupposition-like in nature.

4   Conclusion: lessons to be learned

Face emojis can shed new light on the semantic inferences that arise from natural language expressions such as conditionals (and *if*-clauses more generally), since the emojis target propositions that are salient in the context. The discussion in this paper is based on introspective intuitions of emoji users (see footnote 4) with the aim of establishing testable hypotheses. These hypotheses of course need to be validated by further empirical and experimental testing in follow-up research. For the time being, we can cautiously summarize and conclude as follows. In Section 2, I argued that face emojis can comment on presuppositions of the preceding text, but not on conversational implicatures. In Section 3, we combined face emojis with *if*-clauses, and found that face emojis can comment on the counterfactual inference of subjunctive *if*-clauses. This indicates that counterfactuality is an inference that is presupposition-like and does not behave like a conversational implicature. Having arrived at this conclusion, we thus see that emoji semantics can provide new insights into natural language semantics.

5   Acknowledgments

6   References

Abner, Natasha, Kensy Cooperrider & Susan Goldin-Meadow. 2015. Gesture for Linguists: A Handy Primer. *Language and Linguistics Compass* 9, 437–449.

Anderson, Alan. 1951. A note on subjunctive and counterfactual conditionals. *Analysis* 12, 35–38.

Axel-Tober, Katrin & Patrick Georg Grosz. 2013. Even strong evaluatives can occur under negation. *Snippets* 28.

Ayers, John W. , Theodore L. Caputi, Camille Nebeker & Mark Dredze. 2018. Don't quote me: Reverse identification of research participants in social media studies, *npj Digital Medicine* 1:30.

Bai, Qiyu, Qi Dan, Zhe Mu & Maokun Yang. 2019. A Systematic Review of Emoji: Current Research and Future Perspectives. *Frontiers in Psychology* 10:2221.

Büring, Daniel & Christine Gunlogson. 2000. Aren't positive and negative polar questions the same? Presentation given at the LSA Annual meeting.

Chierchia, Gennaro, Danny Fox & Benjamin Spector. 2012. Scalar implicature as a grammatical phenomenon. In Claudia Maienborn, Klaus van Heusinger & Paul Portner (eds.): *HSK Semantics Volume 3*, 2297–2331. Berlin: de Gruyter.

Dresner, Eli & Susan C. Herring. 2010. Functions of the Nonverbal in CMC: Emoticons and Illocutionary Force. *Communication Theory* 20, 249–268.

Ernst, Thomas. 2009. Speaker-oriented adverbs. *Natural Language and Linguistic Theory* 27, 497–544.

von Fintel, Kai. 2001. Conditional strengthening: A case study in implicature. Manuscript, MIT. http://web.mit.edu/fintel/fintel-2001-condstrength.pdf

Gawne, Lauren & Grechen McCulloch. 2019. Emoji as Digital Gestures. *Language@Internet*.

Geis, Michael L. & Arnold M. Zwicky. 1971. On invited inferences. *Linguistic Inquiry* 2, 561–566.

Giustolisi, Beatrice & Francesca Panzeri. 2021. The role of visual cues in detecting irony. *Proceedings of Sinn und Bedeutung 25*, 292–306. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/938

Grice, H. P. 1975. Logic and Conversation. In Peter Cole & Jerry L. Morgan (eds.): *Syntax and Semantics, 3: Speech Acts*, 41–58. New York: Academic Press.

Grosz, Patrick Georg, Elsi Kaiser & Francesco Pierini. 2021a. Discourse anaphoricity and first-person indexicality in emoji resolution. *Proceedings of Sinn und Bedeutung 25*. https://doi.org/10.18148/sub/2021.v25i0.941

Grosz, Patrick Georg, Gabriel Greenberg, Christian De Leon & Elsi Kaiser. 2021b. A semantics of face emoji in discourse. Manuscript, University of Oslo / UCLA / USC, May 2021 version. https://ling.auf.net/lingbuzz/005981

Grosz, Patrick Georg. 2012. *On the grammar of optative constructions.* Amsterdam: John Benjamins.

Gutzmann, Daniel. 2013. Expressives and beyond: an introduction to varieties of use-conditional meaning. In Daniel Gutzmann and Hans-Martin Gärtner (eds.): *Beyond Expressives: Explorations in Use-Conditional Meaning*, 1–58. Leiden: Brill.

Ippolito, Michela. 2003. Presuppositions and implicatures in counterfactuals. *Natural Language Semantics* 11, 145–186.

Ippolito, Michela. 2007. Semantic composition and presupposition projection in subjunctive conditionals. *Linguistics and Philosophy* 26, 631–672.

Kaiser, Elsi & Patrick G. Grosz. 2021. Anaphoricity in emoji: An experimental investigation of face and non-face emoji. *Proceedings of the Linguistic Society of America, Vol. 6*, 1009–1023. https://doi.org/10.3765/plsa.v6i1.5067

Karawani, Hadil. 2014. The Real, the Fake, and the Fake Fake in Counterfactual Conditionals, Crosslinguistically. PhD dissertation, Universiteit van Amsterdam.

Krifka, Manfred. 2017. Negated Polarity Questions as Denegations of Assertions. In: Chungmin Lee, Ferenc Kiefer & Manfred Krifka (eds.): *Contrastiveness in Information Structure, Alternatives and Scalar Implicatures*, 359-398. New York: Springer.

Ladd, D. Robert. 1981. A first look at the semantics and pragmatics of negative questions and tag questions. In *Proceedings of the Chicago linguistic society*, 164–171.

Leahy, Brian. 2011. Presuppositions and antipresuppositions in conditionals, *Proceedings of SALT 21*, 257–274.

Leahy, Brian. 2018. Counterfactual antecedent falsity and the epistemic sensitivity of counterfactuals, *Philosophical Studies* 175, 45–69.

Lewis, David. 1973. *Counterfactuals*. Cambridge, MA: Harvard University Press.

Liu, Mingya. 2012. *Multidimensional Semantics of Evaluative Adverbs.* Leiden/Boston: Brill.

Maier, Emar. 2021. Emojis as Pictures. Manuscript, University of Groningen. https://ling.auf.net/lingbuzz/006025

Pasternak, Robert & Lyn Tieu. 2021. Co-linguistic content projection: From gestures to sound effects and emoji. Manuscript, https://ling.auf.net/lingbuzz/005082

Patel-Grosz, Pritty, Salvador Mascarenhas, Emmanuel Chemla & Philippe Schlenker. forthcoming. Super Linguistics: an Introduction. https://ling.auf.net/lingbuzz/005242

Pierini, Francesco. 2021. Emojis and gestures: a new typology. *Proceedings of Sinn und Bedeutung 25*. https://doi.org/10.18148/sub/2021.v25i0.963

Pierrehumbert, Janet & Julia Hirschberg. 1990. The meaning of intonational contours in the interpretation of discourse. In Philip R. Cohen, Jerry L. Morgan & Martha E. Pollack (eds.): *Intentions in communication*, 271–311. Cambridge, MA: MIT Press.

Portner, Paul. 1992. Situation theory and the semantics of propositional expressions, PhD thesis. UMass Amherst.

Potts, Christopher. 2007. The expressive dimension. *Theoretical Linguistics* 33, 165–198.

Rett, Jessica. 2021. The semantics of emotive markers and other illocutionary content. *Journal of Semantics* 38, 305–340.

Romero, Maribel & Chung-hye Han. 2004. On negative yes/no questions. *Linguistics and Philosophy* 27, 609–658.

Romero, Maribel. 2006. Biased yes/no questions: The role of VERUM. *Sprache und Datenverarbeitung* 30, 9–24.

Russell, James A. & Jose M. Fernández-Dols (eds.). 1997. *The psychology of facial expression.* Cambridge: Cambridge University Press.

Schlenker, Philippe. 2004. Conditionals as definite descriptions (A Referential Analysis). *Research on Language and Computation* 2, 417–462.

Schulz, Katrin. 2014. Fake tense in conditional sentences: a modal approach, *Natural Language Semantics* 22, 117–144.

Scott, Kate & Rebecca Jackson. 2020. When *EVERYTHING* STANDS OUT, Nothing Does. In Agnieszka Piskorska (ed.): *Relevance Theory, Figuration, and Continuity in Pragmatics*, 167–192. Amsterdam: John Benjamins. https://doi.org/10.1075/ftl.8.06sco

Stalnaker, Robert. 1975. Indicative conditionals. *Philosophia* 5, 269–286. https://doi.org/10.1007/bf02379021

Tatman, Rachael. 2018. What you can, can't and shouldn't do with social media data. Paper presented at Joint Statistical Meetings, Vancouver BC, July 28. Last accessed 28 September 2021 from http://www.rctatman.com/talks/social-media-jsm

von Fintel, Kai & Sabine Iatridou. 2020. Prolegomena to a theory of X-marking. Manuscript, MIT. http://lingphil.scripts.mit.edu/papers/iatridou/fintel-iatridou-2020-x.pdf

von Fintel, Kai. 1998. The presupposition of subjunctive conditionals. In Uli Sauerland & Orin Percus (eds.): *The interpretive tract, MIT Working Papers in Linguistics 25*, 29–44. Cambridge, MA: MITWPL. http://mit.edu/fintel/fintel-1998-subjunctive.pdf

von Fintel, Kai. 1999. NPI licensing, Strawson entailment, and context dependency, *Journal of semantics* 16, 97-148.

Wimmer, Alexander. 2020. On certain conditionals. PhD thesis, University of Tübingen.

Zakkou, Julia. 2019. Presupposing counterfactuality. *Semantics and Pragmatics* 12(21). 1–20. https://doi.org/10.3765/sp.12.21