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The information status of iconic enrichments: modelling gradient at-issueness

Abstract: Linguistic structures can contribute different types of meaning alongside standard assertions, such as conventional implicatures and presuppositions, which have long been described as being non-at-issue meaning contributions. Although information status has long been handled as a binary opposition between non-at-issue and at-issue content, recent research suggests that a gradient approach may be more appropriate. Building on new – and in the formal linguistic framework so far mostly neglected – data targeting spoken and gestural iconicity, specifically iconic gestures and ideophones, this paper investigates the information status of such iconic contributions in spoken language and suggests a new theoretical concept of at-issueness by spelling it out as a gradient category. The paper highlights a range of factors which can affect the information status of iconic contributions, proposing a scale for iconic phenomena based on these factors. To formally model this scale, we propose an approach in which at-issueness is analysed as a gradient property based on a given structure-inherent at-issueness status and the corresponding proposition's relevance to a Question Under Discussion in a given context. This analysis accounts for the variations in information status observed between different iconic enrichments and their impact on truth conditions and paves the way for an approach to Common Ground updates using this model. The analysis outlined here allows for a more nuanced understanding of non-at-issue content and its interaction with at-issue content and provides predictions which can guide further experimental work on information status and the factors that influence it.

Keywords: iconicity; at-issueness; gestures; ideophones

1 Introduction

Linguistic structures can contribute different types of meaning alongside standard assertions, such as conventional implicatures and presuppositions, which have

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long been described as being non-at-issue meaning contributions. As semantic research has turned towards investigating the meaning contributions of iconic enrichments such as iconic gestures and ideophones, there has been particular interest in the at-issueness status of these iconic enrichments as compared to arbitrary items. While experimental work has shown that iconic enrichments appear to be predominantly non-at-issue (cf. Ebert et al. 2020 for gestures and Barnes et al. 2022 for ideophones), there is also evidence that at-issueness may not necessarily be a binary category, but rather a gradient one. The gradient nature of at-issueness has also been indirectly shown for other non-at-issue items by Tonhauser et al. (2018), in experimental work on projectivity. This paper therefore proposes a new approach to at-issueness, whereby it is analysed as a gradient property based on a given structure-inherent at-issueness status and the corresponding proposition's relevance to a Question Under Discussion in a given context.

Building on new – and in the formal linguistic framework so far mostly neglected – data targeting spoken and gestural iconicity, this paper investigates the information status of iconic contributions in spoken language and suggests a new theoretical concept of at-issueness by spelling it out as a gradient category.

The article is structured as follows. Section 2 will provide background on iconicity, at-issueness and research into the at-issueness status of iconic enrichments in language. Section 3 will discuss semantic theories of gestures and experimental research conducted on the at-issueness status of co-speech gestures, while Section 4 will outline semantic analyses of ideophones and what we believe to be the only study on the at-issueness status of ideophones. Section 5 will discuss factors which can impact upon the at-issueness status of iconic enrichments and in doing so highlight the problems with a binary categorisation of at-issueness and propose an alternative gradient understanding of at-issueness. Section 6 will then present our formal analysis of gradient at-issueness and discuss how this relates to previous analyses of at-issueness status. Section 7 will conclude the paper.

2 Background

As part of the renewed interest in iconicity in language in recent years, semanticists have begun to explore the meaning contributions of iconic components in natural language. Some of this research has focused on the pragmatic status of iconic enrichments and in particular, whether they are at-issue or not. In this section, we will briefly outline the renewed interest in iconicity in linguistics, before discussing the theoretical viewpoints regarding at-issueness and its analyses.

2.1 Iconicity

Following de Saussure (1916), who stressed the importance of the arbitrariness of the linguistic sign, formal linguists have generally assumed an arbitrary relation between form and meaning. There is no logical or intrinsic connection between the word *chair* and the physical object that it denotes. So-called iconic forms, such as onomatopoeic words like *bang* and ideophones like *splish-splash* were considered the exception that proves the rule.

Recently, however, linguists have begun to re-examine the role of iconicity in both sign and spoken languages. While sign languages have traditionally been considered more iconic than spoken languages, recent research suggests that iconicity may play a more prominent role in spoken language than previously thought. Perniss et al. (2010) found, in reviewing iconic mappings in signed and spoken language, that both signers and speakers employ iconic mappings and exploit iconicity in language processing and acquisition. Similarly, Goldin-Meadow and Brentari (2017) and Schlenker (2018c) have argued that in order to properly compare the iconicity between the two modalities, sign languages should be compared to speech + gesture, as gesture may allow speakers a similar level of visual expressivity as is available to signers. In terms of lexical iconicity, Blasi et al. (2016), who analysed lists of 100 basic vocabulary items from over two-thirds of the world's languages, found iconic biases in the selection or avoidance of particular sound segments. For example, items denoting the tongue are often associated with the lateral "l" and those denoting the nose with the alveolar nasal "n", which indicates that iconicity may be more prevalent in languages' lexicons than previously thought. These biases also appear to arise independently rather than due to shared linguistic origins, suggesting that languages share preferences for iconic encodings. Perniss et al. (2010) argue that iconicity should be considered as a general property of language, alongside arbitrariness, whereas Flaksman (2017) goes further and proposes that there is a general requirement for expressivity in language, which iconic words help to satisfy. The pressure of the overall arbitrary system, however, means that iconic words gradually become more arbitrary and lose their expressivity. Flaksman argues that this process of deiconization can come about through changes in an iconic item's form, such as sound changes, or its meaning, for example metaphor or metonymy extending the meanings of forms away from their iconic roots (see Flaksman 2020 for detailed discussion of different types of deiconization). This, in turn, forces the introduction of new iconic words, a process which Flaksman calls the "iconic treadmill" and argues that this cycle explains the ongoing emergence of new iconic words across languages.

Formal sign language research has also begun to explore iconicity from a new angle after historically avoiding overemphasising the role of iconicity and instead attempting to highlight similarities to spoken language. Schlenker (2018c), for example, provides an extensive overview of the ways in which iconicity in sign language appears to interact with the logical core of the languages, while also making overt semantic processes that are not visible in spoken language.[1]

As previously mentioned, much of the semantic research into iconicity has been focused on the at-issueness status of iconic enrichments in both sign and spoken languages. The next section will explore definitions of at-issueness, as well as the major theoretical approaches to the at-issue/non-at-issue distinction.

2.2 (Non-)at-issueness

It has long been recognised that certain types of linguistic items and structures, such as presuppositions and conventional implicatures (hereafter CIs), contribute meaning in a different way to standard asserted material; they are generally considered to be not at-issue (see Koev 2018 for a recent overview). One of the most commonly used diagnostics for non-at-issue content is whether it can be directly assented or dissented to in discourse (cf. Tonhauser 2012 for example diagnostics for at-issue content). As can be seen in (1), presuppositions, appositives and expressives cannot be directly denied by an interlocutor.[2] Instead, these structures must be targeted by a discourse interrupting interjection such as *Hey, wait a minute!*.[3]

(1) a. A: **The King of France** is bald.
         B: # No, that's not true. There is no king of France!
         B': Hey, wait a minute! There is no king of France!
     b. A: Maria, **the best musician in town**, came for dinner last night.
         B: # No, that's not true. Lisa is the best musician in town.
         B': Hey, wait a minute! Lisa is the best musician in town!

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1 This paper primarily focuses on two iconic phenomena in spoken language. However, we believe it is important, in any discussion of iconic phenomena, to include reference to sign language in order to fully understand the role of iconicity in language.

2 As only propositions can be assented to or denied, this test relies upon the structures contributing propositional information. We see this as unproblematic, as we assume that the only way for such structures to generate the relevant inferences is for them to indeed contribute propositions.

3 The *Hey, wait a minute!* test was originally proposed by von Fintel (2004) (based on Shannon 1976) for presuppositions and has since been expanded to all non-at-issue content by Potts (2005). See Syrett and Koev (2014) for critical discussion of the limits of this as a test for non-at-issue content.

    c.   A: Ed refuses to look after Sheila's **damn** dog.

            B: # No, that's not true. Sheila's dog is lovely.

            B': Hey, wait a minute! Sheila's dog is lovely.

Simons et al. (2010) have argued that projection under negation and other logical operators is a defining characteristic of non-at-issue content of all kinds. They define at-issue content using relevance to the Question Under Discussion (QUD) and provide the following formal definition (p. 323).[4]

(2)   a.   A proposition *p* is at-issue iff the speaker intends to address the Question Under Discussion (QUD) via *?p*.

      b.   An intention to address the QUD via *?p* is felicitous only if:

          – *?p* is relevant to the QUD, and

          – the speaker can reasonably expect the addressee to recognise this intention.

Simons et al. (2010) define relevance to the QUD using the yes/no question associated with a proposition, where *?p* or *whether p* denotes the partition of the set of worlds into *p* and ¬*p*. A question is relevant to the QUD if it has an answer which contextually entails a complete or partial answer to the QUD, hence *?p* must have such an answer. This then explains why the non-at-issue content in (1) cannot be directly denied; speaker A did not intend to address the QUD via this content and speaker B′ recognises this intention. Thus in order to felicitously address the non-at-issue content, speaker B′ must use a discourse interrupting interjection and propose a new QUD.

    There are alternative definitions of (non)-at-issue content. Esipova (2019, 2021) for example, defines at-issue content as restrictive and non-at-issue content as non-restrictive. In this paper, however, we adopt the definition of at-issueness given by Simons et al. (2010). Nevertheless, in contrast to Simons et al. (2010), we do not take not-at-issueness to be a monolithic category, but instead argue that non-at-issue content is greatly varied and that there are significant differences in behaviour between different kinds of non-at-issue content, for example the projection behaviour of presuppositions and appositives. This raises questions about how and whether to develop a unified approach to categorising and analysing non-at-issue content. This, however, is beyond the scope of this paper. Here, we choose to focus

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4 Hans-Martin Gärtner points out that this formulation is somewhat problematic. Speakers can intend to address the QUD no matter what. However, whether that intention is communicated felicitously, i.e., is felicitously recoverable by the addressee can vary from context to context. One kind of repair would be to start with something like "can be felicitously understood to intend to …" in (1-a) and adjust (1-b) accordingly.

instead on one particular type of CI, namely supplements (cf. Potts 2005, see ex. (3) below), as we argue that most iconic enrichments demonstrate similar behaviour to these.

(3)   Maria, **the best musician in town**, came for dinner last night.

The supplemental appositive in (3) contributes the propositional content that (the speaker thinks that) Maria is the best musician in town. Intonation plays a crucial role here. The appositive is intonationally marked as non-integrated into the main clause. Potts (2005) calls this the '*comma intonation*' (based on Emonds 1976) and assumes that this is the trigger for opening a second non-at-issue layer next to the at-issue semantics that the sentence has.

The contribution of CIs to truth conditions has been somewhat disputed in the literature. In addressing this question, traditional literature on CIs focused on the multi-propositionality of such structures. Bach (1999), for instance, argued that sentences containing CIs, as in (4), contribute multiple propositions, one for the asserted material and one for the CI, and that the varying degrees of prominence of these CI propositions explain why they are difficult to target through negation or direct denial. He further argued that speakers would struggle to judge the truth value of a sentence with a false CI, but true asserted content and that instead, truth conditions should be considered for each proposition independently.

Similar arguments have been given by researchers such as Dever (2001). In his seminal work, Potts (2005) built upon these ideas and developed a multidimensional model and a new logic to account for different kinds of CIs. Within this framework, Potts (2005) argues that CIs are logically and compositionally independent of at-issue entailments and hence they are not at-issue. Potts argues that all CIs share the following basic properties, which are here illustrated by means of supplements (cf. Potts 2007b):

NONDENIABILITY. Supplements cannot be directly denied.

For example, in (4), the appositive structure cannot be directly denied, but must be addressed by a discourse interrupting interjection as in (4-d).

(4)   **Nondeniability:**
    a.   Maria, **the best musician in town**, came for dinner last night.
    b.   No, that's not true. Maria went to the Smiths' for dinner last night.
    c.   #No, that's not true. Lisa is the best musician in town.
    d.   Hey, wait a minute! Lisa is the best musician in town!

SCOPELESSNESS. Supplements cannot appear in the scope of logical operators such as negation.

This can be seen in (5), where the inference from the appositive (highlighted in (5-a)) projects from under negation and the implication that Maria is the best musician in town is not affected.

(5) **Scopelessness:**
  a. It is not the case that Maria, **the best musician in town**, came for dinner last night.
  b. ⇒ Maria is the best musician in town.

ANTIBACKGROUNDING. Supplements can only contribute new information and not information that is already established in the conversation.[5]

In (6-a), the information in the appositive appears odd because it is already given in the preceding utterance and therefore the appositive does not provide new information.

(6) **Antibackgrounding:**
  a. Maria is the best musician in town. # Maria, who is the best musician in town, came to dinner last night.

NONRESTRICTIVENESS. Supplements cannot restrict the meaning contribution made by the at-issue part of the utterance.

(7) **Nonrestrictiveness:**
  # If a musician, a famous one, releases an album, they will make a lot of money, but if a musician, an unknown one, does so, they will make nothing.

In (7), the nominal appositive *a famous one* is used as to give a restrictive reading of *a musician*, which renders the sentence odd as appositives cannot be used restrictively (but see Nouwen 2007, based on observations by Wang et al. 2005, for counterexamples such as *If a professor, a famous one, writes a book, he will make a lot of money*, where the *one*-appositive actually does act restrictively).

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5 Potts (2005) argues that all supplements must contribute new information, however there do appear to be examples where this is not the case. Weinrich (2019, p. 30) provides the following example:

(i) You know that I am working for a tobacco company and I'm facing a lot of backlash because of this. But recently I experienced a whole new level of that. You know that Grant is working in the sales department of that gun producer, right? Well, so he, a weapon salesman, told me that I should be ashamed because my work killed many people and that he, a weapon salesman, doesn't know how I can sleep at night.

Weinrich points out that the appositive 'a weapon salesman' is repeated twice after asserting or reminding that Grant is working in the sales department of a gun producer. He suggests that in these cases, the appositives work like assertions and the speaker pretends that the repeated component is not part of the common ground for rhetoric purposes.

Since the analysis given in Potts (2005), there have been many semantic analyses which develop the original concepts proposed by Potts. These include, among others, Gutzmann (2015) and the dynamic approach proposed by Anderbois et al. (2015), based on the proposal for at-issue content given by Farkas and Bruce (2010). Farkas and Bruce (2010) argue that assertive at-issue content is a proposal by a speaker to update the Common Ground (CG); the proposal is 'put on the table' for discussion, so to speak, until all the interlocutors confirm the proposal and it enters the CG, or it is rejected. Non-at-issue content, however, is not put on the table for discussion. Anderbois et al. (2015) therefore propose a unidimensional approach to appositives, where both the main clause and supplemental content are propositional updates to the CG; the difference is that at-issue content proposes an update of the CG, as in Farkas and Bruce (2010), whereas non-at-issue contributions such as appositives impose their content on the CG. Anderbois et al. (2015) also introduce two propositional variables, which we refer to as p and p^*, to mark at-issue and non-at-issue content, respectively; propositions designated by p are proposals to update the context set, whereas those designated by p^* are silently imposed on the context set.

Anderbois et al. (2015) argue that this approach allows for anaphora between an appositive clause and the main clause, as in (8), where there is an anaphoric link between *a woman* and *her*.

(8)   John, who played tennis with a woman, played golf with her too.

This anaphora is not possible within Potts' framework, as it does not allow for interaction between the at-issue and the non-at-issue dimension. Hence, Anderbois et al. (2015) argue that their unidimensional set-up is preferable to the system proposed in Potts (2005), as it allows for such interactions between at-issue and non-at-issue content.

The majority of approaches to at-issueness assume a binary relationship between at-issue and non-at-issue content, where propositions are defined categorically as either one or the other. Recent research has, however, provided evidence for a more nuanced approach to at-issueness. Anderbois et al. (2015) and Nouwen (2007), for example, propose that appositives can be interpreted as at-issue when they occur at the end of a sentence rather than sentence medially. Syrett and Koev (2014) have also given experimental evidence for this shift towards at-issueness in appositives. Furthermore, while Tonhauser et al. (2018) did not directly investigate the gradient nature of at-issueness, their experimental work on the Gradient Projection Principle, which predicts that content under an entailment cancelling operator will project to the extent that it is not at-issue, showed that the at-issueness of projective content predicts how much it will project, indicating that at-issueness, alongside projectivity, can also be gradient. In a recent presentation, Gutzmann (2017) also argues for at-issueness as a phenomenon of prominence, comparable to salience. The propositions

of one and the same utterance compete for prominence depending on different factors such as structural position, prosodic integration and the like. The most prominent among these propositions will be what is usually seen as the at-issue proposition.

2.3 Iconicity and (non-)at-issueness

As discussed in Section 2.1, recent research into iconic enrichments in sign and spoken languages has aimed to address the at-issueness status of these enrichments. In sign language research, Schlenker (2018b) gives a thorough discussion of iconic enrichments in sign language and their at-issueness status, while research by Kuhn and Aristodemo (2017) has also explored the iconic mapping in pluractional markers in French sign language (LSF), arguing for the at-issue contribution of this iconicity. In spoken language, research into iconic speech-accompanying gestures has shown that they are generally non-at-issue and several semantic approaches have been developed in recent years to account for the meaning contributions of iconic gestures in spoken language, with co-speech gestures being compared to supplements (cf. Ebert and Ebert 2014; Ebert et al. 2020), a specialised form of presupposition or cosupposition (cf. Schlenker 2018a) and non-restricting modifiers (cf. Esipova 2019).

(9)   Cornelia brought [a bottle]_BIG.

In this example from Ebert et al. (2020), the iconic gesture BIG (indicating the upper and the lower bound of a bottle using two hands with the palm of the upper hand facing downwards and the palm of the lower hand facing upwards) is performed in parallel with the speech signal and temporally aligned with the constituent it is semantically associated with, here: the indefinite *a bottle*. It then makes a contribution about the size of the bottle Cornelia brought along. This contribution is usually interpreted as non-at-issue information and analysed as supplemental, cosuppositional, or non-restrictive. Note that due to the fact that the gestural information comes in a mode that is different from the oral modality, it is independent from the speech segment and less integrated than the spoken material that constitutes the sentence. The sentence would be grammatical and complete without the gestural addition.

Attention is now also being paid to the meaning contributions of lexicalised iconic forms in spoken language, and in particular ideophones. Experimental work by Barnes et al. (2022) indicates that sentence-medial adverbial ideophones in German, such as *plitsch-platsch* in the following example, are also not at-issue.

(10)   Der Frosch geht plitsch-platsch die Treppe hoch.
        the frog   goes PLITSCH-PLATSCH the stairs   high
        'The frog goes splish-splash up the stairs.'

Although the ideophone is of the same modality as the rest of the sentence, it shares certain properties with the co-speech gesture in (9). It is not an integral part of the sentence, which would be grammatically complete without the ideophone and it feels less integrated than the other material. This is supported by the fact that it is realized with a specific non-integrational intonation, somewhat parallel to the comma intonation of appositives.

Henderson (2016) has provided a semantic account of ideophones in Tseltal, which is built on the demonstration analysis of Davidson (2015), whereas Kawahara (2020) proposes an analysis for ideophones in Japanese as subjective predicates per Kennedy and Willer (2016).

We believe that these phenomena, which deal with the interplay of ordinary descriptive – and arbitrary – meaning contributions on the one hand and depictive – and hence iconic – contributions on the other, are canonical cases of at-issue information interacting with non-at-issue information. Generally, in natural language, meaning is contributed by using language to describe what one intends to convey. Depictive enrichments add another layer. Since this meaning is of a different nature and often occurs simultaneously with what is being transmitted in the main channel (descriptively used speech), it brings in information of a different dimension, which is usually subordinated. For co-speech gestures this can be seen particularly clearly. Information contributed by gestures is transmitted simultaneously with what is said in the main, verbal, channel, and it is often depictive and iconic and hence of a different nature. Standardly, verbal information then transmits the main, at-issue information part of an utterance, and gesture the non-at-issue pieces of information.

Although ideophones are also verbalized information they are still depictive by nature. They are not given simultaneously with some other verbal information, but add information of a different nature, i.e. iconic information, which cannot be combined straightforwardly with the ordinary descriptive information from the speech channel. This is why ideophones are also usually interpreted as transmitting non-at-issue information (unless they contribute information that is an integral component of an otherwise incomplete utterance, see below).

In the following we will further discuss the gradient nature of at-issueness. We argue that the timing of the information pieces with respect to each other, the nature of this information and the modality involved, alongside other factors heavily influence the degree of at-issueness of a given piece of information. Ebert (2017), for

example, claims that information competes for at-issueness status, with more standalone items being more likely to be at-issue due to a lack of competition. For example, under this approach post-speech gestures would be more at-issue than equivalent co-speech gestures due to the lack of competing speech.

Under this view, appositives are the non-canonical, derived, case of non-at-issue information. They are neither presented simultaneously with other pieces of information that are transmitted nor are they depictive. Yet, we believe that the comma intonation, which Potts (2015) argues is crucial for them, indicates their non-integration into the semantics of the remaining part of the utterance. This can be seen as a means to indicate that what is described in the appositive is of a different nature than the rest. Ideally, this information would be presented simultaneously with other parts of the utterance and hence would compete for at-issueness. However, this is, of course, impossible due to the linear nature of spoken language.

Having discussed the research background on both iconicity and at-issueness, we can now explore research on the at-issueness status of iconic gestures and ideophones in more detail, before discussing how these provide evidence for the gradient nature of at-issueness.

3 Gestures

In seminal work exploring the communicative value of gestures, both Kendon (1980) and McNeill (1992) highlighted that gestures can contribute additional information on top of the speech signal, with gesture and speech often working together to convey one thought. Gestures in this sense can be defined as communicative movements of the head, body and limbs transporting emotions, intentions, and thoughts. While we acknowledge that many bodily movements, as well as facial expressions can be considered gestural, for the time being we restrict our analysis to manual gestures. There are a variety of different manual gestures, such as beat, regulatory/discourse, metaphorical, emblematic, pointing and iconic (cf. McNeill 1992).[6] While gesture has

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6 The gestures not discussed in this article can be briefly defined as follows (cf. Müller 1998):
 – Beat: the hands and arms move in a rhythmic way corresponding to accents in speech and mark what they accompany as important.
 – Regulatory/discourse: gestures which make reference to the discourse organisation or structure, for example turn taking gestures such as holding out a flat palm to indicate it is someone's turn to talk.
 – Metaphorical: similar to iconic gestures, but representing an abstract concept and not a concrete object.
 – Emblematic: gestures conventionalised within certain communities, for example a thumbs up or the victory sign.

long been of interest in semiotics, psychology and cultural studies, its communicative impact has generally not been explored from the perspective of contemporary linguistic semantics. However, as noted in Section 2, semanticists have recently begun to explore the meaning contributions of gestures in spoken language, with particular focus on iconic and pointing gestures. Here, we will only discuss iconic gestures.

McNeill (1992) noted that the temporal alignment of gesture and speech has a significant impact on the interpretation of the gesture, an idea also adopted in semantic research, where iconic gestures have been classified into the following categories according to their positioning with respect to speech: pre-speech, co-speech and post-speech, with Schlenker (2018b) also coining the term *pro-speech gesture* for gestures which replace speech completely. As discussed in Section 2.3 there are currently three prominent formal semantic theories of iconic gestures in spoken language. These theories focus predominantly on co-speech gestures, while also making some predictions for gestures with different temporal alignments. Ebert et al. (2020) (based on Ebert and Ebert (2014)) analyse co-speech gestures as Pottsian supplements, while Schlenker (2018a) provides an analysis of these gestures as cosuppositions and Esipova (2019) takes an alternative approach and proposes that co-speech gestures are a form of modifier. In this section, we will discuss each of these three approaches in turn, before turning to experimental work conducted on the at-issueness status of iconic co-speech gestures.

3.1 Theory

3.1.1 Ebert et al. (2020)

Ebert et al. (2020) (hereafter EEH), spelling out and experimentally validating earlier work of Ebert and Ebert (2014), provide a supplemental analysis of iconic co-speech gestures, in which they contribute meaning in a similar manner to appositives, and argue, based on experimental data (see Section 3.2.1), that co-speech gestures are by default not at-issue. In order to provide a formal semantics for co-speech gestures, they adapt the approach to appositives developed by Anderbois et al. (2015) and employ the propositional variables p and p^* to mark at-issue and non-at-issue content, respectively. Consider example (9) again, repeated below in (11).

(11)   Cornelia brought [a bottle]_BIG.

Crucially, EEH argue that iconic gestures such as the BIG gesture introduce individuals or individual concepts, just like pointing gestures do. In other words, the

gesture does not represent the size of the bottle, but the bottle itself.[7] The gesture represents the bottle, but abstracted away from irrelevant properties and representing in particular the relevant one in the given context, which is the size property. Hence in this case, the iconic gesture BIG represents a big bottle. Formally, we argue that by producing the gesture, this act 'lexically' introduces this bottle as an individual concept, comparable to when uttering a name in spoken language. The gesture directly refers to an object or an individual, represented as the gesture referent g. By producing the gesture, an individual concept for this gesture referent is introduced. This is captured formally by introducing a novel discourse referent for a rigid designator I_g to the gesture referent g (see Ebert et al. 2020 for details).

(12) $[z] \wedge z = I_g$ where for all $w \in W$: $\llbracket I_g \rrbracket(w) = g$

Within this account the interpretation of the gesture is highly dependent on the temporal alignment of gesture and speech; EEH argue that the interpretation of an iconic co-speech gesture depends on how it aligns with the noun phrase and article of a given referent. They give the following analyses of co-speech gestures aligned with a noun phrase, an indefinite article and a definite article.

NOUN PHRASE. The relation between a gesture and a temporally aligned noun phrase is one of exemplification. This simply means that the individual gestural concept z must also have the property expressed by the noun phrase, i.e. $N_{p^*}(z)$.

INDEFINITE ARTICLE. When the gesture aligns with an indefinite article, the conveyed, non-at-issue meaning indicates similarity between the gestural and verbal concept. This is expressed via the two place predicate SIM,[8] such that there is a non-at-issue predication $SIM_{p^*}(x, z)$, where x represents the verbal concept and z the gesture concept. $SIM_{p^*}(x, z)$ is true in the case that the objects denoted by x and z are similar in the relevant dimension. What the relevant dimension is, is highly dependent on the context and determines the execution of the gesture itself, as mentioned above. In this example, the relevant property is the size property. Hence, the utterance in (11), where the gesture aligns with the indefinite article and the noun phrase, can be analysed as in (13).[9]

(13) $[z] \wedge z = I_g \wedge [x] \wedge bottle_p(x) \wedge SIM_{p^*}(x, z) \wedge bottle_{p^*}(z) \wedge$
          $bring_p(Cornelia, x)$

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7 For arguments in favour of this analysis see Ebert et al. (2020) and Umbach and Gust (2014).

8 SIM is adapted from Umbach and Gust (2014), who use it as a three place predicate, with the third argument being a set of dimensions in which the similarity holds.

9 Note that the introduction of discourse referents as well as general identity statements are independent of the at-issue/non-at-issue divide and have to hold globally, i.e. in all worlds. Hence these are not relativized to propositional variables.

Here the at-issue contribution of the utterance is that Cornelia brought a bottle, while the non-at-issue contribution is that this bottle is similar to the gesture referent in the relevant dimension (this is the non-at-issue contribution triggered by the temporal alignment of the gesture with the indefinite article) and that the gesture referent also has the property of being a bottle (this is the non-at-issue contribution triggered by the temporal alignment of the gesture with the noun phrase). The non-at-issue contribution hence is that what is gestured represents a bottle and that what is talked about, i.e. the referent that Cornelia brought, has to be similar to what is gestured. Since what is gestured is a bottle that is big in size, the contribution of the gesture (and its alignment with speech) eventually comes down to claiming that the bottle Cornelia brought is big.

DEFINITE ARTICLE. The alignment of a gesture and a definite article conveys a strengthened relation between gestural and verbal referent, namely one of (relativised) identity or $x =_{p^*} z$, where the verbal concept x and the gestural concept z designate the same object in all the worlds in p^*. Importantly, identity is only required on all p^*-worlds, since the identity requirement, as the similarity requirement in the case of indefinites, is triggered by a co-speech gesture and its alignment with speech, which makes non-at-issue contributions. Hence, the utterance in (14) can be analysed as in (15).

(14)   Cornelia brought [the bottle]_BIG.

(15) $[z] \wedge z = I_g \wedge [x] \wedge \text{bottle}_p(x) \wedge x =_{p^*} z \wedge \text{bottle}_{p^*}(z) \wedge \text{bring}_p(\text{Cornelia}, x)$

In this case, alongside the at-issue and non-at-issue contributions, there is an additional presupposition which requires that there be a unique, contextually salient bottle. The at-issue contribution is that Cornelia brought this unique bottle. The non-at-issue meaning conveys that the gesture referent is the same object as this bottle and is itself also a bottle.[10] Hence the non-at-issue inference is that the unique, contextually salient bottle that Cornelia brought is the same as the one indicated via the iconic gesture and hence big.

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10 The requirement that the gesture referent be a bottle, i.e. $\text{bottle}_{p^*}(z)$, is triggered due to the alignment of NP and gesture. Truth-conditionally, it does not add anything here, since identity of gesture and speech referent already ensures that z is a bottle. A case in point where this requirement would indeed be missing would be an example where the gesture aligns with a pronoun as in *Cornelia brought [it]_BIG*. Although EEH do not discuss such cases, adopting a pronoun semantics where the pronoun is an elliptical definite DP with missing NP part (Elbourne 2005), EEH's account could straightforwardly be applied to these cases and yield as a result the same semantics as given in the formula in (15) with the only amendment that the formula would lack the requirement $\text{bottle}_{p^*}(z)$. This is a desired result. We thank Hans-Martin Gärtner for pointing this out to us.

While EEH argue that co-speech gestures are non-at-issue by default, they also highlight that they can be shifted towards at-issueness status, when accompanied by a dimension shifter, such as a demonstrative, or particular types of focus, prosody and even facial expressions. They show that the German demonstrative *SO*,[11] for example, shifts the non-at-issue content contributed by the gesture in (16) towards at-issueness status.

(16)   *Cornelia hat [SO eine Flasche]_BIG mitgebracht.*
       Cornelia has DEM a bottle with.brought
       'Cornelia brought [a bottle like this]_BIG with her.'

EEH provide an analysis of demonstratives as dimension shifters for co-speech gestures, where the demonstrative simply shifts the proposition of evaluation from p^* to p. Hence the utterance in (16) can be analysed as in (17).

(17) $[z] \wedge z = I_g \wedge [x] \wedge \mathrm{bottle}_p(x) \wedge \mathrm{SIM}_p(x,z) \wedge \mathrm{bottle}_{p^*}(z) \wedge \mathrm{bring}_p(\text{Cornelia}, x)$

Now what is at issue is that Cornelia brought a large bottle, as the previously non-at-issue contribution that this bottle is similar to the gesture referent in size has been shifted to the at-issue dimension. The utterance would be false in the case that Cornelia brought a small bottle. However, the additional contribution that the gesture referent also has the property of being a bottle remains non-at-issue.

While EEH do not directly discuss iconic gestures outside of co-speech gestures, Ebert (2017) has made predictions concerning post-speech gestures. She argues that as post-speech gestures are more standalone than co-speech gestures and do not occur simultaneously with speech, they may be more likely to be at-issue than co-speech gestures.

3.1.2 Schlenker (2018a)

Schlenker (2018a) presents an alternative analysis to Ebert et al. (2020), where co-speech gestures are a specialised form of presupposition. Schlenker highlights that the projection patterns of iconic co-speech gestures and presuppositions are highly similar; and argues that a co-speech gesture triggers a presupposition which requires its content to be entailed by the content of the expression it modifies. Hence presuppositions triggered by co-speech gestures are conditionalised on the at-issue content of the assertion. Schlenker gives the following definition of presuppositions triggered by co-speech gestures (p. 316–317):

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11 The capitals here mark obligatory stress on the demonstrative.

(18)   **Cosuppositions triggered by co-speech gestures**[12]
Let *G* be a co-speech gesture co-occurring with an expression *d'* whose type 'ends in t', and let *g* be the content of *G*. Then *G* triggers a presupposition $d' \Rightarrow g$, where $\Rightarrow$ is generalized entailment (among expressions whose type 'ends in t').

Given the utterance in (19), Schlenker argues that the gesture triggers the cosupposition that if Johnny's mother helped him, this involved some lifting.

(19)   Johnny's mother [helped]_UP him.

Assuming that the asserted, at-issue proposition is true, i.e. that Johnny's mother did indeed help him, and if the cosupposition holds, then Johnny's mother must have helped him in a way that involved some lifting. Importantly Schlenker notes that, in order to prevent this analysis from overgenerating inferences, for example by positing that helping always entails lifting, the content of the co-speech gesture should be entailed by its local context and not the global context. We can therefore see that in a given situation, such as a gymnastics competition, for example, helping would entail some kind of lifting, but that this need not always be the case. Schlenker (2018a) further argues that co-speech gestures are comparable to weak presupposition triggers such as *realise* and can therefore be easily locally accommodated. In the case of cosuppositions triggered by co-speech gestures, local accommodation results in the content of the gesture being treated as an at-issue contribution, if the sentence is true and if the speaker is not in a context where the cosupposition is already known to hold.

     Crucially, Schlenker furthermore argues that it is empirically adequate to state that the cosupposition also holds in cases of negation or subordination under a modal operator and discusses examples as the following ones.

(20)   Johnny's mother did not [help]_UP him.

Here, it is stated that Jonny's mother did not help him. But additonally, the gesture triggers the (cosuppositional) inference that had she helped him it would have been via lifting.

     Finally, Schlenker (2018b) has also argued that pro-speech gestures, as in (21) are by default at-issue.

(21)   Your brother, I am going to SLAP.

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12 The framework is built on the semantics proposed by Heim (1982) for presuppositions. For the definition of types 'that end in t' (='conjoinable types'), see Rooth and Partee (1982).

This claim seems to be intuitive because the gesture stands in for crucial lexical material, which would be at-issue and therefore if the gesture were to be non-at-issue, then the sentence would be incomplete and infelicitous.

3.1.3 Esipova (2019)

Esipova (2019) provides an alternative approach to both EEH and Schlenker (2018a), arguing that co-speech gestures are neither inherently at-issue nor non-at-issue, and that their interpretation is not dependent on temporal alignment with speech. Her approach rests upon the idea that narrow syntax and semantics proper are both modality-blind, meaning that gestures compositionally integrate in the same manner as spoken items. Not all gestures can necessarily be compositionally integrated, however. Esipova argues that this is not a problem if we do not assume a uniform analysis for all gestures.

Giving the gesture LARGE as an example, Esipova claims that gestures are "non-lexicalized and [carry] little morphosyntactic information" (p. 92), hence they can either be property-like, in this case similar to the adjective *large*, and act as modifiers, or they can be nominal-like, in this case similar to the nominal phrase *a large one*, and be supplements. As modifiers, they can either be restricting and therefore at-issue or non-restricting and therefore non-at-issue. Supplements, per Potts (2005), cannot be restricting and therefore nominal-like gestures are non-at-issue. Supplemental gestures project as supplements, whereas only non-restricting modifier gestures project in the same manner as other non-restricting modifiers.

Esipova further points out that restricting modifier gestures tend to be dispreferred by speakers and argues that this is likely not due to constraints on restricting co-speech gestures in semantics or narrow syntax, but rather constraints in the phonology or pragmatics. She highlights that one potential explanation for this degradedness comes from Schlenker (2018a), who notes that there is a general preference for gestures to be semantically vacuous, i.e. making a redundant contribution, as when there are meaning contributions from two modalities within one utterance, the contribution in the secondary modality should be redundant.

In terms of pro-speech gestures, Esipova (2019) argues that these should be theoretically acceptable as restricting modifiers, but they are often degraded in English due to linearisation and prosodic grouping, which are to some extent language-specific. She does, however, provide examples of pro-speech gestures with restricting interpretations in French, as in (22), and Russian.

(22) *Si   Mélanie   amène   son   chien_SMALL,   ça ira.   Mais   si*
      if   Mélanie   brings   her   dog_SMALL   it   will.go   but   if
      elle   amène   son   chien_LARGE,   ce   sera   un   problème.
      she   brings   her   dog_LARGE,   it   will.be   a   problem
      'If Melanie brings her dog_SMALL, then it will be OK. But if she brings her
      dog_LARGE, it will be a problem.'

Overall, all three approaches observe that post-speech gestures and pro-speech gestures have an at-issueness status that is, at least by default, different from that of co-speech gestures. While Schlenker claims that co-speech gestures and post-speech gestures are non-at-issue, with pro-speech gestures being at-issue, he also argues that co-speech gestures give rise to cosuppositions, a special kind of presupposition, whereas post-speech gestures act as supplements. Esipova, on the other hand, argues that the at-issueness status depends on whether the gestures are restricting or not. However, likely due to the fact that they are performed at the same time as the verbal material they accompany, co-speech gestures are often not at-issue, which is not the case for pro- or post-speech gestures. Finally, EEH account for the default non-at-issueness status of co-speech gestures, with Ebert (2017) furthermore arguing that the more standalone a gesture is, the more at-issue it tends to be. This then makes the prediction that pro- and post-speech gestures are more at-issue than co-speech gestures.

3.2 Experimental work

While semantic theories on gestures are becoming more and more prominent in the literature, there is still little empirical research being conducted on gestures within semantics. In the remainder of this section, we will present one of the main studies providing evidence for the at-issueness status of iconic co-speech gestures (see also Tieu et al. 2017, 2018 for further experimental work on the information status of gestures).

3.2.1 Ebert et al. (2020)

In an experiment conducted with native speakers of German, Ebert et al. (2020) found empirical evidence for the non-at-issueness status of iconic co-speech gestures. The experiment consisted of a sentence-picture matching task, using a 2×2 design, which crossed two MODE conditions, iconic co-speech gestures and adjectives, with two MATCH conditions, match and mismatch, in a Latin square design. The two MODE conditions were realised through 24 target sentences and the variation between gesture and adjective was realised as in (23) and (24).

(23)   **Gesture:**
        Auf   diesem   Bild   ist [ein Fenster]_ROUND   zu   sehen
        on   this   picture is   [a   window]_ROUND to   see
        'In this picture, you see [a window]_ROUND.'

(24)   **Adjective:**
        Auf   diesem   Bild   ist ein rundes Fenster   zu   sehen.
        on   this   picture is   a   round   window   to   see
        'In this picture, you see a round window.

The variation in the MATCH condition was implemented with two pictures, where one picture matched the conditions in the target sentence, while the other did not. An example item can be seen in Figure 1.

     Overall, there were 24 target sentences, each paired with one matching and one mismatching picture. The procedure for the experiment was as follows; participants were shown a video of a female speaker uttering a sentence. In the target sentences, the speaker also produced a gesture in the gesture condition. All videos were accompanied by a picture. Participants were asked to rate how well the description given by the speaker in the video matched the image using a scale from 1 to 5 with 5 being the sentence perfectly matches the circumstances in the picture and 1 being that it does not match at all.
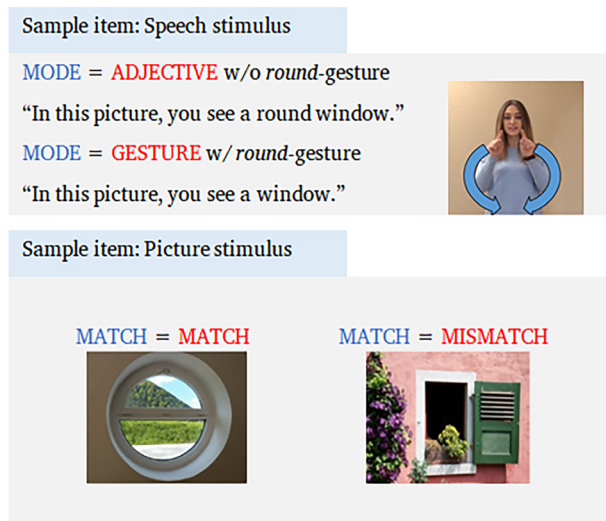

Figure 1: Sample item (Ebert et al. 2020).

The experiment was designed as an indirect test of at-issueness. The goal was to have participants evaluate the truth of the target sentence in relation to the situation given by the picture. These truth judgements were gathered via the participants' response to the meta-question of how well the description in the video matched the picture. The use of a meta-question and rating scale also allowed for participants to express subtleties of judgements with respect to sentences where the information appears to be partly false and partly true. As per research conducted by Kroll and Rysling (2019), which showed that speakers' truth value judgements are less impacted by information deemed irrelevant to the QUD, i.e. non-at-issue information, the specific hypothesis was that, if co-speech gestures were non-at-issue, there would be a significant interaction of the factors MODE and MATCH, such that the mismatch effect (the difference between ratings in the matching and mismatching conditions) would be significantly larger for target sentences containing adjectives than those with speech accompanying gestures. Since no overt QUD was given it was assumed that participants would construe a very generalised QUD matching their understanding of what is at-issue and what is not.

The results of the experiment supported the hypothesis, with the mismatch effect being significantly greater for adjectival target sentences than for co-speech
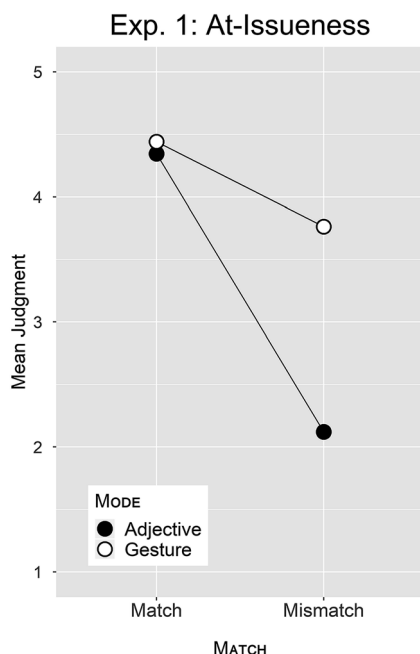

Figure 2: Results of experiment 1 (Ebert et al. 2020, p. 173).

gesture sentences (see Figure 2). EEH therefore argue that these findings corroborate the claim that adjectives contribute at-issue information, whereas co-speech gestures contribute non-at-issue content.

In a second variation of this experiment, EEH repeated the above experiment with the same materials and procedure, but an additional third MODE condition, where iconic co-speech gestures were accompanied by the German demonstrative *SO*. The same target sentences were used as in the iconic co-speech gesture condition, except that the noun phrase was accompanied by the demonstrative *SO* and the condition was also realised with a video of a speaker uttering the sentence and simultaneously producing the gesture. The onset of the gesture was aligned with the onset of the German demonstrative *SO*. An example item can be seen in (25).

(25)   **Gesture** + DEM:

Auf   diesem Bild   ist [SO   ein Fenster]_ROUND   zu sehen
on   this   picture is   [such a   window]_ROUND   to see
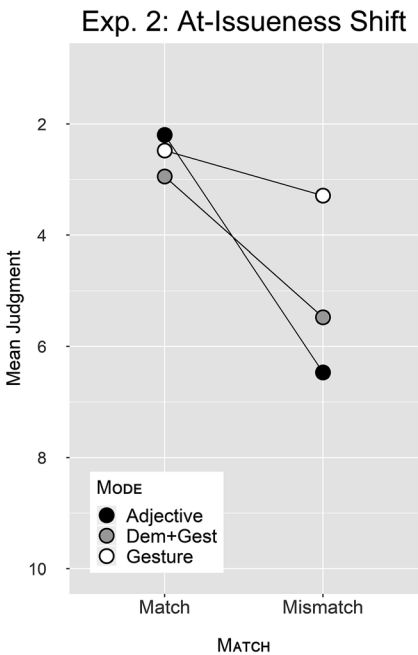'In this picture, you see a window like that_ROUND.'

Figure 3: Results of experiment 1 (Ebert et al. 2020, p. 174).

The hypothesis in this variant was that the demonstrative would shift the gesture towards at-issueness status and that the mismatch effect for demonstrative target items would therefore be closer to that of the adjective target sentences. This claim was supported by the results of the experiment, with the mismatch effect being larger for sentences with gestures accompanied by demonstratives than for sentences with gestures not accompanied by demonstratives (see Figure 3). However, this mismatch effect was still not as strong as for adjectives, indicating that while the demonstrative did shift the gesture towards at-issueness, it was still not as at-issue as the adjectives. This provides evidence for not viewing at-issueness as binary, but rather gradient, as was discussed in Section 2.2.

Having discussed gestures as one prominent type of iconic meaning in natural language, we will now turn to another class of iconic phenomena: ideophones. While gestures use the visual modality, ideophones use the same modality as other spoken language phenomena.

4 Ideophones

Ideophones have long been of interest in fields such as cultural studies and within areas of linguistics such as crosslinguistic typology and phonology, where aspects such as the semantic categories they are able to express and their sound-symbolism have been key areas of study (cf. Dingemanse 2012 for an overview of this research). While they are somewhat lacking in Western European languages, ideophones are prolific in languages such as Japanese, the Bantu languages of South Africa and Pastaza Quichua and they have been argued to be a universal or near-universal feature of human language (Diffloth 1972; Kilian-Hatz 1999).

Dingemanse (2019, p. 16) defines ideophones as "[…] an open lexical class of marked words that depict sensory imagery". Here, we will provide a brief overview of each aspect of this definition, using examples from German (see Barnes et al. 2022 for a detailed argument for the existence of ideophones in German).

OPEN LEXICAL CLASS. Dingemanse argues that the size of the class of ideophones in Japanese is comparable to other open lexical classes in many languages and as such they should be considered one. This does not necessarily mean that all the ideophones must belong to one syntactic class, though. While it may be argued that some languages do not have the same range of ideophones as Japanese, Dingemanse also points out that examples of ideophone creation and ideophonisation in a language

indicate an open lexical class. Ćwiek (2022), for example, has shown evidence of idiosyncratic ideophone manipulation and creation in German.

MARKED. Ideophones are always marked with respect to the morphology and phonology of the language in which they occur. In German this markedness often occurs as reduplication, as in *zack-zack* and *husch-husch*, or in the unusual morphology of ideophones such as *hopplahopp* and *holterdiepolter*.[13]

WORDS. Ideophones must also be conventionalised forms with specifiable meanings.

DEPICT. Dingemanse furthermore argues that ideophones depict rather than describe. In Dingemanse (2013) he illustrates this with the ideophone *tyádityadi*, from Ewe, which roughly means "be walking with a limp". An example from English would be *splish splash*, which generally describes some kind of movement involving water or wetness which results in splashing sounds. Dingemanse (2013) argues that while the translated expression "be walking with a limp" describes an event of walking with a limp using arbitrary signs that must be interpreted according to a conventionalised linguistic system, *tyádityadi* depicts the event iconically, using a combination of speech rate, loudness and phonation type, which would likely also be accompanied by expressive intonational foregrounding and gesture, as well as being reduplicated. Similarly, *splish splash*, when used in a sentence such as the *The frog went splish splash up the stairs* iconically depicts how the frog's wetness and movement up the stairs produced splashing sounds, whereas a sentence such as *The frog went up the stairs, making splashing sounds* gives an arbitrary description of the frog moving up the stairs. As argued by Barnes et al. (2022) (and in Section 2.3), we take the fact that ideophones are depictive and not descriptive as indicative of them contributing meaning in a different manner to other linguistic items.

SENSORY IMAGERY. Dingemanse (2012) claims that ideophones rely on "perceptual knowledge that derives from sensory perception of the environment and the body". Nuckolls (2019) notes that onomatopoeic ideophones have often been viewed as simplistic and downgraded compared to other ideophones. However, she highlights phonetic research that shows that producing sound-symbolic vocalisations requires significant effort in vocal manipulation, as well as neurolinguistic evidence that sound is important in cross-modal relations with other sensory perceptions. As an example, Ćwiek (2022) found evidence for the multisensory nature of German ideophones such as *holterdiepolter*, which could initially be taken as simply sound-symbolic.

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13 See Kentner (to appear) for discussion of such reduplication in unserious, expressive situations in German.

It is also worth pointing out that a great deal of literature on ideophones has noted the common co-occurrence of ideophones and iconic gestures. In research conducted using a corpus of Japanese speakers retelling Tweety cartoons, Kita (1993, 1997) found that 94 % of ideophones were accompanied by a gesture. Dingemanse (2013) argues that as spoken narratives are more likely to produce ideophone and gesture combinations, this study may overestimate their prevalence. However, he does claim that as iconic gestures and ideophones are both depictive, it makes sense that speakers would use the two together in order to fully exploit the multimodal nature of the iconic performance. In Dingemanse (2015), he also highlights that speakers in Siwu, when asked to define ideophones, often use iconic gestures to clarify meaning aspects of the ideophones, which may be difficult to express using ordinary vocabulary items. For certain ideophones, very similar gestures were used across speakers, which suggests that these ideophone-gesture pairs may be somewhat conventionalised. Furthermore, Nuckolls (2019) highlighted that in Pastaza Quichua, ideophones encoding movement often co-occur with iconic gestures that contribute additional information. She argues that these gestures act as pragmatic embellishments of the ideophone content. In their research on the morphosyntactic integration, Dingemanse and Akita (2016) also found that less morphosyntactically integrated ideophones in Japanese are more likely to be accompanied by iconic gestures, which appear to enhance the expressiveness of the ideophones and correlate with other expressive modifications of the ideophones such as expressive morphology and intonational foregrounding. Multimodal performances seem to be common place in iconic structures and can also be seen in the combination of facial gestures and manual signs in sign languages. Hence any investigation of the at-issueness status of iconic enrichments must also consider the meaning contributions of combined iconic items, such as ideophones and gestures.

Although there has been much research conducted into ideophones in other areas of linguistics, there has been little semantic work conducted on them. The remainder of this section will first lay out two of the semantic accounts so far provided for ideophones, before proposing a supplemental analysis of the meaning contribution of ideophones. We will then discuss what we believe to be the only experimental work on the at-issueness status of ideophones.

4.1 Theory

4.1.1 Kawahara (2020)

Kawahara (2020) argues that Japanese predicative ideophones are subjective predicates and claims that they have both a core at-issue meaning and a subjective

meaning, which encodes their sound-symbolic nature, adapting the counterstance analysis of subjective attitude verbs given by Kennedy and Willer (2016) in order to account for this subjective nature.

Kennedy and Willer (2016) argue that subjective predicates differ from objective ones based on the pragmatic distinction speakers make between objective facts and arbitrary matters of linguistic practice. They give an example where two speakers agree on the objective fact that Lee eats oysters, but not meat, but disagree on whether eating oysters makes him a non-vegetarian or not and hence whether Lee is in the extension of *vegetarian*. In order to model this formally, they introduce information states, $s \subseteq W$, which are sets of possible worlds and the set of all information states, $S = \wp(W)$. They furthermore assume that the context c gives a context set of s_c of what is in the common ground, as well as two functions: κ_c and κ_c^*. κ_c then derives a set of counterstances for an information state. The formal definition is given in (26).

(26) κ_c: $\wp(W) \mapsto_p \wp(\wp(W))$ maps selected $s \subseteq W$ to the set of worlds just like s except for contextually salient decisions about how to resolve indeterminacy of meaning; every $s' \in \kappa_c(s)$ is a COUNTERSTANCE s with respect to c.
(Kennedy and Willer 2016, p. 921)

These counterstances agree with the information state with respect to all objective facts, but disagree on how to resolve matters of linguistic practices. For example, in all counterstances Lee does not eat meat, but does eat oysters, however, in these counterstances *vegetarian* is a property of individuals who don't eat meat, but either a) includes or b) does not include those who eat oysters. A proposition such as *Lee is vegetarian* is therefore subjective, or counterstance contingent,[14] if there is at least one counterstance within the set of generated counterstances $\kappa_c(s)$ where the proposition is not true, i.e. if there is at least one counterstance where Lee is not within the extension of *vegetarian*. Counterstance contingency can be defined formally as in (27).

(27)   A proposition $p \subseteq W$ is *counterstance contingent* in context c iff $\exists s \in S\ \exists s' \in \kappa_c(s)$: $s \subseteq p$ & $s' \nsubseteq p$. (Kennedy and Willer 2016, p. 921)

Kennedy and Willer (2016) argue that speakers can make certain stipulative discourse moves which act to fix certain contextual parameters and therefore help to resolve uncertainties in meaning in discourse. For example by determining the kinds of eating habits that should be considered when deciding if someone is a vegetarian. They term this COORDINATION BY STIPULATION. However not all contextual

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14 Kennedy and Willer (2016) use this as an alternative term to subjective, arguing that it provides a clearer definition of the phenomenon.

parameters can be naturally fixed, for example what makes something tasty or what characteristics make someone fascinating. They highlight this distinction with the examples in (28) and (29). According to Kennedy and Willer (2016) the examples in (28) seem natural, whereas those in (29) appear odd.

(28)   For the purposes of this discussion …
    a.   … let's count Lee as vegetarian, since the only animals he eats are oysters.
    b.   … let's count these oysters as expensive, because they cost $36 per dozen.

(29)   For the purposes of this discussion …
    a.   ??… let's count Lee as fascinating, since he is an expert on oysters.
    b.   ??… let's count these oysters as tasty, because of their texture and brine.

Formally, this difference is modelled using the second function provided by the context set, κ_c^*. κ_c^* partitions $\kappa_c(s)$ into "a set of equivalence classes of counterstances that agree on parameters that support coordination by stipulation" (Kennedy and Willer 2016, p. 919). κ_c^* is formally defined as follows:

(30) $\kappa_c^* : \wp(\wp(W)) \mapsto_p \wp(\wp(\wp(W)))$ PARTITIONS $\kappa_c(s)$ into a set of counterstances so that in every partition π every parameter that supports coordination by stipulation is held constant.
(Kennedy and Willer 2016, p. 921)

As such, propositions with predicates such as *tasty* are said to be radically counterstance contingent meaning that no matter how the counterstance space is partitioned, within each partition there will always be one counterstance where the proposition is false. The definition for radically counterstance contingent propositions is given in (31).

(31)   A proposition $p \subseteq W$ is *radically counterstance contingent* in context c iff
$\exists s \in S : s \subseteq p$ & $\forall \pi \in \kappa_c^*(\kappa_c(s))$ $\exists s' \in \pi : s' \not\subseteq p$.
(Kennedy and Willer 2016, p. 922)

Adopting this approach, Kawahara (2020) then argues that propositions with predicative ideophones in Japanese such as *karikari, sakusaku, paripari* (Engl: *crispy*) are radically counterstance contingent. However, according to Kawahara (2019, 2020) these ideophones are gradable and related to a subjective scale, meaning that, although they cannot combine with measure phrases, they can be compared when related to the same subjective scale. This means that these ideophones differ from other subjective predicates, as they can be sorted into sets based on the shared

standard for their scales. Speakers can therefore select different ideophones from among this set based on their stance. Formally, this can be expressed as in (32).

(32) $[\![P(x)]\!]^{c,w}$ is defined only if $[\![P(x)]\!]^c$ is radically counterstance contingent in context *c*. If defined, then $[\![P(x)]\!]^{c,w} = [\![CRISPY(x)]\!]^{c,w}$, where
P = predicative ideophones (based on the scale of crispiness): *karikari, sakusaku, paripari*, etc.

Kawahara argues therefore, that for a sentence such as (33-a), a speaker may respond as in (33-b). Here the speakers both agree that the pie has the general property of being crispy, but disagree on the exact properties of the pie that make it crispy.

(33)   a.   *Kono pai-wa   karikari   da.*
            this   pie-TOP   IDEO   COP
            'This pie is karikari (crispy).'
       b.   *Iya,   karikari   dewa   nai.   (Sakusaku-da.)*
            no   IDEO   COP   NEG   IDEO-COP
            'No, this pie is not karikari (crispy). (It is sakusaku (crispy).)'

Kawahara claims that this is where the sound symbolic nature of ideophones comes into play; the speaker of (33-b) may feel that *sakusaku* better depicts the crispiness of the pie, for example, due to its form better representing the manner in which the layers of the pie break. The approach proposes then that the ideophones encoding the core meaning of crispiness in Japanese form a set and that speakers may choose from the ideophones in this set based on their subjective view of which ideophone best depicts a given referent.

   This analysis is intuitive, as it is likely that speakers interpret the iconicity of ideophones in idiosyncratic and subjective ways and may therefore have a preference for one ideophone over another. The examples Kawahara uses are, though, all predicative ideophones, which we argue necessarily have an at-issue contribution.[15] Nevertheless, we believe that Kawahara's account provides a good analysis of the dual nature of predicative ideophones where part of the meaning is at-issue,[16] but the iconic component of the ideophone remains non-at-issue (see Section 4.1.3 for further discussion of this point).

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15 However, as Hans-Martin Gärtner notes, at-issueness can be relative. For example, predicative ideophones could be embedded within other non-at-issue structures, such as appositives, as in (i)

(i)   This pie, which is *karikari*, cost me $ 3.

Here then, *karikari* would be part of the non-at-issue semantics of the sentence.

16 It is unclear what Kawahara (2020) means by *core at-issue meaning* and whether this refers to at-issueness as we refer to it here. However, this is not crucial to our approach.

4.1.2 Henderson (2016)

Henderson (2016) provides an account of ideophones as demonstrations based on data from Tseltal. To do this, he adapts and formalises the analysis of quotation as demonstration given by Davidson (2015). The basic ideophone construction in Tseltal is formed by combining the verbal stem of the ideophone with the reportative speech marker *chi*. However, Henderson argues that ideophones are not simply quoted in Tseltal, but that the basic ideophone construction represents an ideophone-specific form of demonstration. He analyses ideophone stems (without the reportative marker) as predicates of events, as in (34) and introduces an operator IDEO-DEMO,[17] which is included in the basic ideophone construction. Just as Davidson (2015) argues that the demonstration argument in spoken quotations in English is introduced by the *be like* construction, IDEO-DEMO is introduced through the use of the IDEO + *chi* construction in Tseltal.

(34) $[\![\text{IDEO}]\!] = \lambda e[\text{IDEO}(e)]$

(35)   IDEO-DEMO: $\lambda u \lambda d \lambda e[\text{TH}_\delta(d) = u \wedge \text{STRUC-SIM}_{\llcorner u \lrcorner}(d, e)]$

This operator selects for ideophone stems in the syntax and in the semantics gives an expression that can be embedded under *chi*; in other words, IDEO-DEMO "[…] takes a linguistic expression […] and derives a relation between demonstrations and events" (p. 673). Henderson furthermore argues that the ideophone satisfies the theme argument of the basic ideophone construction with the reported speech marker *chi*, similarly to how the quoted utterance would satisfy the theme argument in a *be like* construction. In order to become the theme of the basic ideophone construction, the ideophone must therefore be of a particular type, namely a linguistic entity. Henderson (2016) simplifies Potts (2007a) and takes linguistic entities as pairs, ⟨string, SEMANTIC REPRESENTATION⟩, where the string is the orthographic/ phonological representation of the natural language expression and the SEMANTIC REPRESENTATION is the lambda term denoting the appropriate function. For example, the unquoted natural language expression *woman* is translated to the lambda term as in (36), whereas the quoted natural language expression "*woman*" is translated as the constant of type μ[18] whose denotation is the pair of the unquoted string and its denotation, as in (37).

(36) $\lambda x_e[\text{WOMAN}(x)]$

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17 The bottom corners around an expression are used to access the semantic content of a linguistic object, i.e. the second component of an object as given in example (37).

18 Per Potts (2007a), μ indicates the domain of linguistic entities, which is disjoint from all other domains.

(37) $[\![woman_\mu]\!] = \langle woman, \lambda x_e[\text{WOMAN}(x)]\rangle$

The IDEO-DEMO operator therefore requires that the utterance of an ideophone is itself a demonstration and that there be a structural similarity between the ideophone utterance event and the event it depicts. Davidson (2015) intentionally underspecifies the relation between demonstrated and demonstration event, requiring only that the demonstration reproduce salient aspects of the demonstrated event. However, Henderson (2016) argues that the event depicted by the ideophone must satisfy the relevant aspects of the ideophone's lexical content. For example, only events including an inhaling sound can be depicted by the ideophone *jik'*. The STRUC-SIM$_{\llcorner u \lrcorner}$ relation provides this condition. STRUC-SIM$_{\llcorner u \lrcorner}$ ensures that the "utterance of an ideophone as a linguistic object" stands for an event that satisfies the ideophone predicate. Formally, this is the case if the demonstrated event can be partitioned so that:
– all subevents satisfy the relevant aspects of the ideophone predicate's lexical content;
– the cardinality of the partition is equal to or greater than the number of atomic parts of the demonstration;
– there is a temporal similarity between the partition and the atomic parts of the demonstration.

Henderson gives an example using the Tseltal ideophone *tsok'*, which encodes the sound of something frying in oil, seen in (38).

(38)   *Tsok'   x-chi-∅   ta   mantekat*
              IDEO   say   in   lard
              'It goes "tsok" in the lard.'

Henderson (2016) gives the truth conditions of (38) as:
– there is an event *e* that takes place in the lard and the agent is x_1 (an individual given by the context or variable assignment).
– the demonstration event has the linguistic object *tsok'* as its theme.
– the demonstration event is structurally similar to *e*:
  – As d_{13} is an atomic event, *e* must also be partionable into an atomic event (trivial partition).
  – *e* must satisfy the predicate $\lambda e[TSOK'(e)]$, i.e. it must be an event of frying sound emission.

This is shown formally in (39).

(39) $\exists e[AG(e) = x_1 \wedge TH_\delta(d_{13}) = tsok' \wedge \text{STRUC-SIM}_{\llcorner tsok' \lrcorner}(d_{13}, e) \wedge LOC(e)$
         $= \sigma x[LARD(x)]]$

This approach directly integrates the ideophone into the truth conditions of the sentence, and while Henderson (2016) does not make explicit reference to the at-issueness status of these ideophones, we argue that in these cases the ideophone is predicative and is therefore necessary for both the well-formedness of the sentence and its semantics and is hence used for the computation of the at-issue semantics. Similarly, the combination of the ideophone with the reported speech particle clearly marks the ideophone as part of a quotational or demonstration structure, which as we argue in the next section, also renders the ideophone necessarily at-issue.

4.1.3 A supplemental approach

Here we present an initial, supplemental analysis for adverbial and predicative ideophones which draws upon parts of the approaches in Kawahara (2020) and Henderson (2016) and is based upon data from ideophones in German. However, before we discuss the formal details of the approach, we would like to highlight three factors which appear to impact on the at-issueness status of ideophones (see Barnes et al. 2022 for a more detailed discussion of these factors).

MORPHOSYNTACTIC INTEGRATION. Crosslinguistically, it has been noted that ideophones demonstrate different behaviour depending on their syntactic category (cf. Kita 1997, 2001; Toratani 2016). For example, Dingemanse (2017) argues that more morpho-syntactically integrated ideophones in Siwu, such as predicative ideophones, are, in contrast to adverbial ideophones, able to be negated, used in questions and can contribute old information. These properties appear to indicate more at-issue behaviour and indeed, we argue that predicative ideophones must be partly at-issue; they are essential to the integrity of the sentence and must make some at-issue contribution in order for the sentence to be interpretable. However, we claim that predicative ideophones are *mixed items* (cf. Gutzmann 2011; McCready 2010), similar to Pottsian expressives such as *Köter* 'mutt', which has the at-issue contribution of denoting a dog and the non-at-issue contribution that the speaker has a negative attitude towards said dog.

Dingemanse (2017) furthermore argues that there may be a typological scale of morphosyntactic integration of ideophones, where in languages with more inte-grated ideophones, such as Somali, the ideophones tend to be less expressive, while in languages where ideophones are less integrated, as in Semai, the ideophones are more expressive. Seeing as we predict that more integrated ideophones are also more at-issue, we could then also predict, based on this scale, that languages with

more integrated ideophones will be more likely to have more at-issue ideophones than those with a lesser degree of morphosyntactic integration.

QUOTATION AND DEMONSTRATION WITH IDEOPHONES. Drawing upon the analysis of ideophone demonstration in Henderson (2016), we propose that ideophones which are quoted or used in demonstrations are also shifted towards at-issueness status. When an ideophone is accompanied by a quotation or demonstration marker, it is directly referred to in the speech and must therefore be partly at-issue in order for the sentence to be felicitous. We furthermore argue, in line with Davidson (2015) and Ebert and Hinterwimmer (2022), that demonstratives such as *like* in English or *so* in German can act as quotation/demonstration markers and therefore an ideophone accompanied by a demonstrative will also be shifted towards at-issueness status.

ALIGNMENT AND TIMING. Dingemanse (2013) notes that ideophones at clause edges generally have more prosodic foregrounding and expressive morphology than those embedded within other constructions, which would likely make them more prominent prosodically and semantically and therefore could indicate that they are more at-issue.

Recall that we find the same tendency as discussed here for ideophones also with gestures: both tend to be more at-issue towards the end of a sentence or the more standalone they appear to be. Both also appear to be shifted towards at-issueness by way of demonstratives. And both are interpreted as at-issue when they form an integral component of an otherwise incomplete utterance.

In general, the crosslinguistic literature indicates several properties of ideophones which are similar to those of non-at-issue content and in particular, co-speech gestures and Pottsian supplements. This includes the fact that ideophones are generally not negated, nor used in questions and that they tend to provide background information (cf. Dingemanse 2017; Kita 1997, 2001; Toratani 2016). These properties are mostly true of adverbial ideophones, which appear to be the most common realisation of ideophones crosslingusitically (cf. Akita 2009).

We propose, therefore, that adverbial ideophones have a similar meaning contribution to co-speech gestures as per the supplemental approach outlined in EEH. While there has been little semantic work on ideophones, other linguistic research provides some evidence to support an analysis of adverbial ideophones as supplements. Kita (1997, 2001) in fact provides an analysis of ideophones in Japanese that closely resembles the multidimensional approach to CIs given by Potts (2005), where he argues that standard linguistic information occurs in the 'analytic' dimension and ideophones in the 'affecto-imagistic' dimension. The following examples illustrate how the four key properties of supplements as described by Potts (2005) seem to apply to most cases of adverbial ideophones.

NONDENIABILITY. Similarly to appositives and other non-at-issue content, it appears that adverbial ideophones cannot be directly denied, but should rather be addressed

via a discourse interrupting interjection, such as in the *Hey, wait a minute!* test. This is shown in (40).

(40)   a.   *Der Frosch geht plitsch-platsch die Treppe hoch.*
            the   frog   goes PLITSCH-PLATSCH the stairs   high
            'The frog goes splish-splash up the stairs.'

       b.   *Nein, das stimmt nicht. Der Frosch geht die Treppe runter.*
            no   that is.right not   the frog   goes the stairs   down
            'No, that's not true. The frog goes down the stairs.'

       c.   *#Nein, das stimmt nicht. Der Frosch geht doch völlig*
            no   that is.right not   the frog   goes but   completely
            geräuschlos die Treppe hoch.
            silently   the stairs   high
            'No, that's not true. The frog goes up the stairs in complete silence.'

       d.   *Hey, warte mal. Der Frosch geht doch völlig   geräuschlos*
            hey   wait   once the frog   goes but   completely silently
            die Treppe hoch.
            the stairs   high
            'Hey, wait a minute! The frog goes up the stairs in complete silence.'

SCOPELESSNESS. Adverbial ideophones, like appositives, also appear to be odd when they appear in the scope of negation, as in (41) and (42), where we argue that they are only acceptable as part of meta-linguistic utterances, used in response to a previous utterance.

(41)   ??*Der Frosch geht nicht plitsch-platsch die Treppe hoch.*
            the   frog   goes not   PLITSCH-PLATSCH the stairs   high
            'The frog does not go splish-splash up the stairs.'

(42)   ?*Niemand geht plitsch-platsch die Treppe hoch.*
            nobody   goes PLITSCH-PLATSCH the stairs   high
            'Nobody goes splish-splash up the stairs.'

Other researchers have also noted that adverbial ideophones cannot appear in the scope of logical negation, including Dingemanse and Akita (2016) for Siwu and Kita (1997, 2001) and Toratani (2016) for Japanese.

ANTIBACKGROUNDING. Supplements are said to generally contribute new information, as was pointed out above, where we also critically discussed this claim (see footnote 5). Likewise, it has often been noted that adverbial ideophones tend to only contribute new information (see Dingemanse 2017).

However, as in the case of supplements, it is at least debatable whether this holds in general. Consider the following example.

(43)   *Der   Frosch   ist   ganz   nass   und   macht   laut   platschende*
       the   frog   is   completely   wet   and   makes   loud   splashing
       Geräusche, als   er   voran   springt. Schnell   springt   er
       noises   as   he   forward   jumps   quickly   jumps   he
       plitsch-platsch   die   Treppe   hoch.
       PLITSCH-PLATSCH   the   stairs   high
       'The frog is completely wet and makes loud splashing noises as he jumps
       along. Quickly, he jumps splish-splash up the stairs.'

Although the continuation in example (43) seems a bit odd with the redundant ideophonic information about how the frog went up the stairs, it is certainly not illicit.[19] We leave the discussion about the antibackgrounding condition for supplements and ideophones for future research.

   NONRESTRICTING. Supplements cannot be used to restrict the at-issue content of the utterance in which they occur. (44) appears to make little sense unless a very specific context is set up, for example one where boxes are on the stairs in such a way that Peter would need to zig-zag between them to get down the stairs. However, in this case we argue that the ideophones would be somewhat meta-linguistic and this would therefore not be a true example of restriction.

(44)   ??*Wenn   Peter   die   Treppe   holterdiepolter   runterläuft,   dann   wird*
       if   Peter   the   stairs   IDEO   down.runs   then   will
       er   sich   verletzen. Wenn   er   aber   die   Treppe   zickzack
       he   himself   injure   if   he   but   the   stairs   IDEO
       runterläuft,   wird   er   nicht   stolpern.
       down.runs   will   he   not   stumble
       'If Peter runs helterskelter down the stairs, then he will hurt himself. But
       if he runs down the stairs in a zigzag, he won't stumble.'

Given these properties of ideophones and based on the evidence gathered in experimental work by Barnes et al. (2022) (see Section 4.2.1), we present a formal analysis of adverbial ideophones building upon both the analysis that EEH give for iconic co-speech gestures and the analysis of gestural-quotational demonstration by

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19 We believe the example even improves if *plitsch-platsch* occurs at the beginning of the second sentence (*Plitsch-platsch springt er die Treppe hoch* 'Splish-splash, he jumps up the stairs'). We tentatively suggest that this is due to the ideophone being less 'integrated' into the sentence, resulting in it being more at-issue and therefore no longer being supplemental in nature and hence not being subject to any antibackgrounding restriction whatsoever. This would also be the case if the ideophone was sentence-medial but somehow marked as separate from the rest of the sentence, for example through prosodic foregrounding.

Ebert and Hinterwimmer (2022). Here, we still adopt a binary view on at-issueness, which we will refine in Section 6 below.

We argue that ideophones have two meaning components, like mixed items such as *Köter* 'mutt' do. The first is the ideophone's conventionalised meaning. In contrast to ordinary mixed items, however, both meaning components of ideophones contribute non-at-issue information, while for *Köter* it is assumed that the meaning that the individual in question is a dog is at-issue.[20] Hence, the conventionalised meaning contribution of an adverbial ideophone is the same as that of a standard adverbial, namely an event modifier. For example, the use of *plitsch-platsch* in (45) indicates that the frog went up the stairs *in a splashing manner*. The second meaning contribution is the iconic meaning of the ideophone. Dingemanse (2013) argues that varying aspects of the ideophone's utterance contribute to its iconicity, including phonology, prosody and gesture. In order to capture the iconic nature of the ideophone, we follow Henderson (2016) and model the utterance of an ideophone as a demonstration, per Davidson (2015). This enables us to capture all elements of the utterance which contribute to the iconic mapping of the ideophone to the event. Unlike Henderson (2016), however, we do not attempt to specify the exact iconic relation between the event and the ideophone utterance or to integrate this into the truth conditions. Instead, we argue that the utterance of an ideophone alongside a report of an event results in the default non-at-issue inference that the ideophone utterance iconically depicts the event described by the main assertion. We choose to model this using the SIM predicate, which allows for these varying aspects to contribute to the iconic depiction in differing manners depending on the individual utterance and the context in which it occurs.

Applying this to the previous examples, we can then give an analysis of the form of (46) for an utterance such as (45). We again adopt the propositional variables p and p^* to mark at-issue and non-at-issue content respectively.[21]

(45)   *Ein Frosch geht plitsch-platsch die Treppe hoch.*
       a   frog   goes splish-splash the   stairs   high
       'A frog goes splish-splash up the stairs.'

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20 It is, however, conceivable that the two components contribute to different non-at-issue dimensions, and that one is, in fact, more at-issue than the other. In the system of gradient at-issueness that we will introduce below one might envisage such mixed items with meaning components of different degrees of non-at-issueness.

21 As with the introduction of discourse referents and general identity statements, thematic event predicates such as *agent* are independent of the at-issue/non-at-issue divide and have to hold globally, i.e. in all worlds and are therefore also not relativized to propositional variables. The upper corners around an utterance u indicate that it makes reference to the form of the utterance and mark it as the linguistic string. This is in contrast to the bottom corners used by Henderson (2016), which are used to derive the semantic content of a linguistic entity.

(46)　　$[e] \wedge \text{goes-up-the-stairs}_p(e) \wedge [x] \wedge \text{agent}(e,x) \wedge \text{frog}_p(x) \wedge \text{splashing}_{p^*}(e)$
$\wedge [d] \wedge d = d_{\ulcorner\text{plitsch-platsch}\urcorner} \wedge \text{SIM}_{p^*}(e, d_{\ulcorner\text{plitsch-platsch}\urcorner})$

The at-issue contribution of the utterance then says that there is an event of a frog going up the stairs. The non-at-issue contribution is that this event has the property of being a *splashing* event and that there is a demonstration, namely the utterance of *plitsch-platsch*, which is similar in the relevant dimensions to the event of the frog going up the stairs.

　　As in the cases of co-speech gestures, adverbial ideophones accompanied by a demonstrative also appear to shift towards at-issueness, as in (47). While a plain ideophone seems to be odd as an answer to a wh-question as in (47-b) (see (47-c)) due to its non-at-issueness status, shifting at-issueness via a demonstrative improves the ideophone as an answer (see (47-d)).

(47)　a.　*Der Frosch geht plitsch-platsch die Treppe hoch.*
　　　　　the　frog　　goes　PLITSCH-PLATSCH　the　stairs　high
　　　　　'The frog goes splish-splash up the stairs.'
　　　b.　*Wie geht der Frosch die Treppe hoch?*
　　　　　how　goes　the　frog　　the　stairs　high
　　　　　'How does the frog go up the stairs?'
　　　c.　# *Plitsch-platsch.*
　　　　　　PLITSCH-PLATSCH
　　　　　'Splish-splash.'
　　　d.　*So　plitsch-platsch.*
　　　　　DEM　PLITSCH-PLATSCH
　　　　　'Like splish-splash.'

We therefore analyse (48) as in (49).

(48)　　*Ein Frosch geht so plitsch-platsch die Treppe hoch.*
　　　　a　frog　goes　DEM　PLITSCH-PLATSCH　the　stairs　high
　　　　'A frog goes like splish-splash up the stairs.'

(49)　　$[e] \wedge \text{goes-up-the-stairs}_p(e) \wedge [x] \wedge \text{agent}(e, x) \wedge \text{frog}_p(x) \wedge \text{splashing}_p(e) \wedge [d]$
$\wedge d = d_{\ulcorner\text{plitsch-platsch}\urcorner} \wedge \text{SIM}_p(e, d_{\ulcorner\text{plitsch-platsch}\urcorner})$

The at-issue contribution of the utterance then says that there is an event of the frog going up the stairs, which has the property of being a *splashing* event and that there is a demonstration, namely the utterance of *plitsch-platsch*, which is similar in the relevant dimensions to the event of the frog going up the stairs. The meaning contributions of the ideophone have been shifted to at-issueness status by the demonstrative.

Adverbial ideophones appear to also behave like co-speech gestures, in that they seem to receive a more at-issue interpretation when shifted to the end of the sentence they occur in, as in (50), where it seems that the ideophone can be directly denied. At least such a response seems to be an improvement when compared to (40-c) as an answer to (40-a).

(50) a.   *Ein Frosch geht die Treppe hoch - plitsch-platsch!*
             a   frog   goes the stairs high   PLITSCH-PLATSCH
             'A frog goes up the stairs – splish-splash!'
    b.   *(?) Nein, das stimmt nicht. Der Frosch geht doch völlig*
            no   that is.right not   the frog   goes but completely
            geräuschlos die Treppe hoch.
            silently   the stairs   high
            'No, that's not true. The frog goes up the stairs without a sound.'

As previously noted, this analysis applies only to adverbial uses of ideophones. In German, it appears to be possible to make a predicative structure with an ideophone, although in these cases there seems to be a requirement for an auxiliary verb to form the predicate. As can be seen in (51), these predicative uses can be directly denied, in contrast to adverbial uses, suggesting that these ideophones may be partly at-issue.

(51) a.   *Ein Frosch macht plitsch-platsch im Garten.*
             a   frog   makes PLITSCH-PLATSCH   in   garden
             'A frog goes splish-splash in the garden.'
    b.   *Nein, das stimmt nicht. Es hört   sich ganz   anders   an!*
            no   that is.right not   it sounds REFL completely different on
            'No, that's not true. It sounds completely different!'

We propose the analysis in (52) for an utterance such as (51-a).

(52) $[e] \wedge [x] \wedge \text{agent}(e, x) \wedge \text{frog}_p(x) \wedge \text{makes-splash}_p(e) \wedge \text{loc}(e, \text{in-the-garden})$
        $\wedge\ [d] \wedge\ d\ =\ d_{\ulcorner \text{plitsch–platsch} \urcorner}\ \wedge\ \ \text{SIM}_{p^*}(e, d_{\ulcorner \text{plitsch–platsch} \urcorner})$

Here, the predicative ideophone takes the event as an argument giving the at-issue contribution that some sort of event of splish-splashing occurred, in which the frog was the agent. However, there is still the non-at-issue contribution that there is a demonstration, namely the ideophone utterance, which is similar to the main event, thus encoding the iconic component of the predicative ideophone. This demonstrates the mixed item analysis we mentioned for predicative ideophones earlier in this section. Predicative ideophones, like ordinary mixed items, make some sort of at-issue contribution, but still maintain a non-at-issue iconic contribution, just as *Köter* provides at-issue reference to the property of being a dog, while also providing the non-at-issue implication that the speaker has a negative opinion of dogs.

There also appear to be some ideophones in German, such as *ratzfatz* and *ruckzuck*, that, even when used adverbially, have this mixed interpretation. In (53), it seems to be possible to directly deny the ideophone contribution.

(53) a. *Die Bank hat ratzfatz eine Milliarde gewonnen.*
          the bank has RATZFATZ a billion won
          'The bank earned a billion very quickly.'

      b. *Nein, das stimmt nicht. Es war nur zehn Millionen.*
          no that is.right not it was only ten million
          'No, that's not true. It was only ten million.'

      c. *(?) Nein, das stimmt nicht. So schnell ging das gar nicht.*
          no that is.right not so quickly went that absolutely not
          'No, that's not true. It wasn't that quick at all!'

The question then arises as to why these ideophones can receive a mixed interpretation, even when used adverbially, whereas other ideophones in German, such as *plitsch-platsch*, cannot. One potential explanation comes from Dingemanse (2017), who highlights that in Siwu, more frequently used ideophones are more likely to be able to be used predicatively and hence behave more like ordinary words and are more prone to deideophonisation. It could be then that *ratzfatz* and *ruckzuck* have become more conventionalised due to frequent use and therefore the conventionalised part of their meaning has shifted to at-issueness status. We would expect more at-issue ideophones undergoing a process of deideophonisation to occur more frequently overall, but particularly in written language. An informal survey of German corpora seems to support this claim; the DWDS-Kernkorpus (1900–1999); the Metakorpus WebXL (01/1995-03/2021); the DWDS-Zeitungskorpus (from 1945) and the ZDL-Regionalkorpus (from 1993), give the following combined frequency values for *ratzfatz*, *ruckzuck*, *holterdiepolter* and *plitsch-platsch*:

– *ruckzuck*:
  – 5,530 entries = Frequency Level 1
– *ratzfatz*:
  – 10,200 entries = Frequency Level 1
– *holterdiepolter*:
  – 1,239 entries = Frequency Level 1
– *plitsch-platsch*:
  – 48 entries = Frequency Level 0

The DWDS lists 7 frequency levels (0–6), with frequency level 0 covering items with 5–1,029 entries and frequency level 1 items with 1,030–10,295 entries. While we have to leave further investigation of this question to future research, we believe it is worth pursuing and we would like to also compare the frequency of these

ideophones in written and spoken language, looking at when specific ideophones first appeared and seeing if there are particular peaks in their frequency and how their usage has developed over time.

Our approach is not incompatible with either Kawahara (2020) or Henderson (2016) and in fact incorporates elements of both approaches. The main difference, however, is that our analysis makes explicit reference to and can account for the at-issueness status of ideophones in both adverbial and predicative structures. The next section will build upon this theoretical basis by discussing experimental work on the at-issueness status of ideophones.

4.2 Experimental work

As far as we are aware, there has been no previous experimental research conducted on the at-issueness status of ideophones. This section will therefore present the first experiment of this kind conducted by Barnes et al. (2022), which investigated the at-issueness status of sentence-medial ideophones in German.

4.2.1 Barnes et al. (2022)

The research goal of Barnes et al. (2022) was to establish whether sentence-medial adverbial ideophones in German contribute non-at-issue content. It adapted the experimental design of EEH, with two variants of the experiment, one using visual stimuli, the other audio stimuli.

The first variant of the experiment used a 2×2 design, which crossed the two CATEGORY conditions, ideophone and adverbial, with the two MATCH conditions, match and mismatch in a Latin square design. The two CATEGORY conditions were realised through 20 target sentences and the variation between ideophone and adverbial was realised as in (54). The adverbials were selected based on two pre-studies, which were used to identify the best paraphrases or equivalents for the ideophones.

(54) a. **Ideophone**
     Der Frosch geht plitsch-platsch die Treppe hoch.
     the frog   goes PLITSCH-PLATSCH the stairs high
     'The frog goes splish-splash up the stairs.'
   b. **Adverbial**
     Der Frosch geht mit einem platschenden Geräusch die Treppe hoch.
     the frog   goes with a   splashing   noise   the stairs high
     'The frog goes up the stairs with a splashing noise.'

The variation in the MATCH condition was implemented through fairytale contexts, which were chosen as it was hoped that ideophones would appear more natural and less marked in such scenarios than in other, more everyday ones. An example of the contexts can be seen in (55).

(55)   Da die Königstochter ihn nicht mitnimmt, muss der Frosch sich allein auf den Weg zum Schloss machen. Er ist immer noch ganz nass vom Teich, …
        'Because the king's daughter did not take him with her, the frog must make his own way to the castle. He is still completely wet from the pond …'

   a. **Match**
       … so dass das Wasser auf den Pfad und auch noch auf die Treppe des Schlosses tropft, als er zur Königstochter hüpft.
       '… and the water drips off him on the path and on the stairs of the castle as he hops after the king's daughter.'

   b. **Mismatch**
       … aber die Sonne brennt. Das Wasser von seinem Körper tropft noch auf den Pfad, aber als er die Treppe des Schlosses erreicht, hat die Sonne ihn fast ausgetrocknet und er ist so durstig wie noch nie in seinem Leben.
       '… but the sun is burning down. The water drips from his body on to the path, but as he reaches the stairs to the castle, the sun has almost completely dried him out and he is thirstier than he has ever been.'

The procedure for the experiment was as follows; participants were shown the context and asked to read it carefully before also reading the target sentence. They were then asked to rate how well the target sentence matched the circumstances described in the context on a scale from 1 to 5, where 5 indicated a perfect match and 1 that they did not match at all.

   The experiment assumed the same theoretical background as EEH, and predicted that if ideophones are non-at-issue and hence irrelevant to a constructed generalized QUD, then they should have less impact on participants' judgements of how well a sentence matches a given context than adverbials, which are taken to be at-issue. Or in other words, the mismatch effect should be stronger for adverbials than for ideophones.

   This hypothesis was supported by the results of the experiment, which showed that the mismatch effect was larger for the adverbials than for the ideophones, indicating that ideophones are less at-issue than adverbials. However, ideophones were rated more poorly than adverbials in the matching conditions, which were
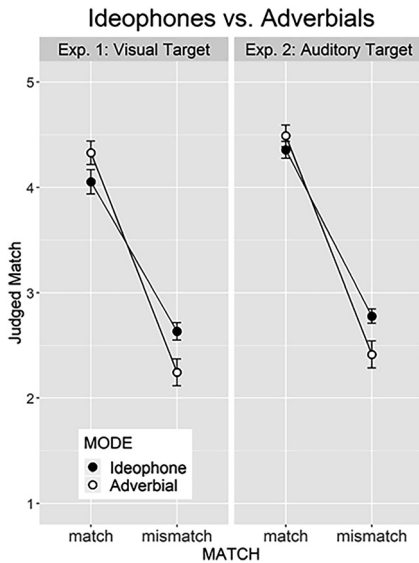
Figure 4: Results of audio and visual experiments (Barnes et al. 2022).

taken to be indicative of the general markedness of ideophones and the fact that speakers will generally disprefer them compared to ordinary words.[22] (See Figure 4 for results).

The second variant of the experiment was conducted in order to establish whether ideophones would be less marked when spoken than when written. The experiment used the same design and materials as the first variant, except that the target sentences were spoken by a native speaker instead of written.

The procedure was the same as the first variant, except that after reading the context, speakers clicked on a play-icon to hear the spoken sentence and then rated how well the sentence matched the circumstances in the context.

The hypothesis was that the experiment would replicate the results of the first experiment, but that ideophones would be rated more favourably in the match conditions due to being spoken. While the results did replicate the first experiment in showing a larger mismatch effect for the adverbials than for the ideophones, they did not show significantly more favourable ratings for ideophones in the match conditions.

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22 Following Barnes et al. (2022), we are not limiting markedness to structural properties as in Dingemanse (2019), but instead to the fact that ideophones are relatively rare in languages such as German and therefore appear more odd to speakers.

Notably, this experiment indicates that while sentence-medial adverbial ideophones in German are not at-issue, they appear to be more at-issue than co-speech gestures. The differences in the mismatch effects for ideophones and adverbials seem to be smaller than the difference between gestures and adjectives in EEH.

Having seen the evidence for the at-issueness status of iconic enrichments such as gestures and ideophones and how this status can be affected by various factors, in the next section we will return to the concept of binary at-issueness and discuss how, with respect to iconic enrichments, a categorical distinction between at-issue and non-at-issue is inadequate.

5 The problem with binary at-issueness

As discussed in Sections 2.2, 3.2.1 and 4.2.1, recent evidence suggests that at-issueness may be more nuanced than a binary distinction between at-issue and non-at-issue content. Tonhauser et al. (2018) investigated how projective different non-at-issue items are and found that items which are more at-issue tend to be less projective. While this experimental work did not directly target gradient at-issueness, it does provide evidence that non-at-issue items can be more or less at-issue. Additionally, experimental work by Xue and Onea (2011) shows that presuppositions project differently depending on what they were triggered by. The authors relate these variations to at-issueness. The experimental work conducted by Syrett and Koev (2014) showed that appositives occurring at the end of a sentence could be at-issue, a claim that had also been predicted by Anderbois et al. (2015) and Nouwen (2007), suggesting that standardly non-at-issue content can be shifted to at-issueness status. In terms of iconic enrichments, Ebert (2017) has argued that information competes for at-issueness status and that the more standalone a piece of information is, the more likely it is to be at-issue. She makes the prediction that post-speech gestures may therefore be more at-issue than co-speech gestures.

The experimental work described in this paper also provides indirect evidence for the gradient nature of at-issueness. EEH found that utterances with co-speech gestures that transported false information and which were accompanied by a demonstrative were not rated as highly as utterances with false co-speech gestures without demonstratives, but still better than utterances with adjectives carrying false information. This indicates that the information contributed by co-speech gestures which are accompanied by a demonstrative is more at-issue than that given by co-speech gestures without a demonstrative, but still less at-issue than the information provided by ordinary adjectives. Similar experimental work found that, in

German, sentence-medial adverbial ideophones carrying information that contradicted the given context were rated better than corresponding utterances where the information was given by way of an ordinary adverbial. Again, this indicates that the information carried by a sentence-medial adverbial ideophone is less at-issue than that carried by an ordinary adverbial. However, utterances with false ideophone information were still rated more poorly than ones with false co-speech gesture information, which suggests that the information carried by sentence-medial adverbial ideophones is more at-issue than that of co-speech gestures. A potential explanation for this difference in at-issueness is that the ideophones occur in the same modality as the main communicative act.

Assuming that speakers' judgements on the appropriateness of utterances given a certain background (via contexts or pictures) reflect how much they actually agree with the information given by the parts of the utterance, we propose that these parts of the utterance contribute to the judgement to differing degrees, depending on how at-issue they are. For example, highly at-issue content will contribute more to a speaker's judgement than content which is non-at-issue at all. We hence argue that at-issueness is not a binary distinction, but rather gradient, and that iconic enrichments can fall at different stages along this scale of at-issueness dependent on varying factors. Here, we aim to provide an overview of different factors which may influence the at-issueness status of these enrichments and cause them to be more or less at-issue in relation to each other and also to other, more arbitrary items. Based on these factors, we propose an initial scale of at-issueness, which accounts for the gradient nature of at-issueness and encompasses the impact of these factors.

5.1 Internal versus external enrichments

The more integrated an iconic enrichment is in a sentence, the more at-issue it appears to be, as can been seen with pro-speech gestures and predicative ideophones. One account for this comes from Schlenker (2018b), who proposes a distinction between internal and external iconic enrichments (see also Goldin-Meadow and Brentari 2017, who discuss iconic aspects of classifiers as representatives of internal enrichments). Internal iconic enrichments are part of the at-issue contribution of the sign they modify and thus affect the integrity of this sign if they are eliminated, rendering the utterance unacceptable. Schlenker (2018b) provides the example of the sign GROW from American Sign Language (ASL). The sign involves the signer moving their hands away from each other and signers can manipulate the speed at which they move their hands and how far apart their hands are when they finish the sign in order to iconically depict the speed that or amount with which
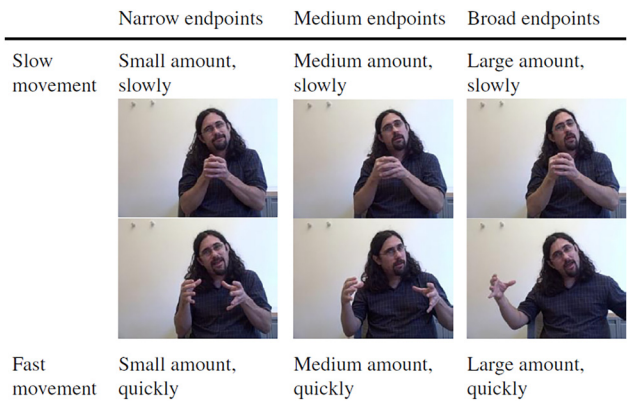
	Narrow endpoints	Medium endpoints	Broad endpoints
Slow movement	Small amount, slowly	Medium amount, slowly	Large amount, slowly
Fast movement	Small amount, quickly	Medium amount, quickly	Large amount, quickly

Figure 5: Iconic modification of GROW in ASL (Schlenker 2018b, p. 884).

something grew.[23] An example can be seen in Figure 5. Schlenker therefore argues that internal enrichments, such as the iconic manipulation of GROW, can either be at-issue or not at-issue. External enrichments on the other hand can be eliminated without affecting the integrity of the utterance and according to Schlenker, are not at-issue. Co-speech gestures would therefore be an example of an external enrichment, whereas, as Schlenker (2018b) notes, pro-speech gestures are integral to the meaning of the sentence and are thus internal enrichments. This is mirrored by adverbial and predicative ideophones; adverbial ideophones appear to be external enrichments and can be eliminated from a sentence without impacting upon its integrity. Predicative ideophones, though, are integral to the at-issue contribution of the sentence and cannot be eliminated without rendering the utterance unacceptable. We diverge somewhat from Schlenker (2018b), however, and instead argue that in order for a sentence to be felicitous, an internal enrichment such as a pro-speech gesture or a predicative ideophone must be at least partly at-issue.

Nevertheless, as argued in Section 4.1.3, while predicative ideophones or pro-speech gestures must be partly at-issue, they may still have a non-at-issue iconic component. This could easily be the case for other iconic enrichments, such as ASL GROW, where the sign may make an at-issue contribution describing growth, while

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23 While it is unclear if sign languages have 'neutral' means of signing such signs, it is likely that the Maxim of Quantity could be applied here, as Davidson (2015) has argued for classifiers in ASL. If a signer does exert extra effort in order to move their hands further apart or to do this particularly quickly, then interlocutors can assume this is an iconic modification. However, should the signer not wish to convey an iconic modification, then it is likely they will move their hands the minimal amount/easiest or smoothest way possible and in line with the speed that they generally sign. In that case, it would not be so clear that this additional indication of speed and amount is actually 'internal'.

also contributing non-at-issue, iconic information about the speed and amount of growth. Davidson (2015), for example, argues that the handshape feature of sign language classifier constructions is linguistic, whereas the location and movement features are iconic and gestural, which could also indicate that they are not at-issue. It is therefore possible that although internal enrichments must be at least partially at-issue and therefore will always be more at-issue than external enrichments, they may still be less at-issue than other, standard arbitrary at-issue contributions due to their non-at-issue, iconic components.

5.2 Structural position and timing slot

Another factor which impacts on at-issueness appears to be the structural position or timing slot of an iconic enrichment. As previously discussed, Syrett and Koev (2014) have provided empirical evidence that appositives occurring sentence finally are able to be at-issue. Ebert (2017) has suggested that this shift towards at-issueness is due to the fact that standalone information is more likely to be at-issue than information which must directly compete with other information. Schlenker (2018b) also makes a related proposal, arguing that enrichments with their own, individual timing slot, which is not shared with other communicative information, are more likely to be at-issue. Not only does this predict that post-speech gestures may be more at-issue than co-speech gestures, but that the more removed the post-speech gesture is from the spoken utterance, the more at-issue it will become. Similarly, applied to ideophones, this suggests that an adverbial ideophone that occurs at the end of a sentence, and is therefore more standalone, would be more at-issue than a sentence-medial adverbial ideophone embedded within a sentence (cf. examples (40) and (50) above).

5.3 Quotation and demonstration

As has been discussed for both gestures and ideophones in this paper, the way an utterance makes reference to iconic enrichments also seems to influence their at-issueness status. When the iconic enrichment is embedded under quotation markers or preceded by a demonstrative, this seems to shift the enrichment towards at-issueness status.

   These types of structures, where a demonstrative picks up a depictive structure have also been discussed in psychological literature. Clark (2016, p. 326) gives the example of an utterance such as in (56), where the demonstration is in square brackets and italics and is referenced by the demonstrative *this* at the end of the

sentence. Clark terms this indexed depiction, where a depictive communicative act is introduced by an indicative communicative act.

(56)   At the University of Illinois where I used to teach, there was a voice [*raising voice with RH gesturing dramatically toward audience*] professor who said you should always speak like this.

Nevertheless, as previously mentioned, EEH also note that while co-speech gestures accompanied by demonstratives are more at-issue than gestures without these, they are still less at-issue than ordinary adjectives.

5.4 Modality

Finally, modality, although potentially the most obvious factor influencing at-issueness status, also seems to make a significant contribution to how information is interpreted. In spoken language, the predominant modality is the aural-oral modality, whereas the visual modality is secondary. For example, as Schlenker (2018a) notes, there is a preference for co-speech gestures to be truth-conditionally vacuous as they occur in the secondary modality. It seems plausible then that the modality that the enrichment occurs in and how this relates to the primary modality of that language may influence the at-issueness status of the enrichment. Ideophones for example occur in the spoken modality in spoken language, whereas co-speech gestures are in the visual modality; this may then explain why adverbial ideophones are more at-issue than co-speech gestures. This also applies to sign languages, where the dominant form of communication uses manual signs, but meaning can also be expressed using facial expressions and mouth shapes. Sandler (2009) in fact argues that certain facial expressions used in sign languages to enrich manual signs may be considered facial gestures. These facial gestures may therefore be non-at-issue or less at-issue than manual signs.

While each of the above factors influences iconic enrichments in differing ways, they are not mutually exclusive and all of them interact with each other in varied ways. For example, while a demonstrative may shift a gesture towards at-issueness status, the gesture is still part of the secondary modality and therefore less at-issue than for example an ideophone accompanied by a demonstrative. Another example would be the impact of internal/external enrichments upon structural positioning; an ideophone used predicatively is generally less syntactically free than an adverbial ideophone and hence cannot be manipulated to be more standalone in the same manner. It appears then that multiple factors impact upon and influence each iconic enrichment and their at-issueness status.

5.5 Proposal: gradient at-issueness

Based on the evidence from experimental and theoretical work and the discussion of the factors above, we propose a gradient view of at-issueness, wherein different iconic enrichments – by default – fall upon a scale of at-issueness based on whether they are internal or external, their structural position, the modality in which they occur and how they are referenced by the utterance in which they occur. An initial outline of such a scale for iconic expressions in spoken language can be seen in Figure 6.[24]

   This is by no means a complete scale and there are likely to be additional iconic enrichments which could be added, along with additional factors that will have to be considered. However, the scale shown in Figure 6 provides an initial idea of how iconic enrichments may fall upon the scale of at-issueness. Note that we assume that this scale represents the (minimal) default degree of at-issueness the respective items and constructions exhibit. While an iconic co-speech gesture often and by default contributes its meaning with a rather low degree of at-issueness, this does not exclude the case that in a certain conversational structure the gesture is entirely at issue. In other words, the scale in Figure 6 represents the minimal degree of at-issueness a certain construction or item must have and how different structures relate to each other with respect to this minimal at-issueness requirement. In a certain discourse context, however, it might well be the case that, for example, information represented by a co-speech gesture is more at issue than information given by way of an ideophone.
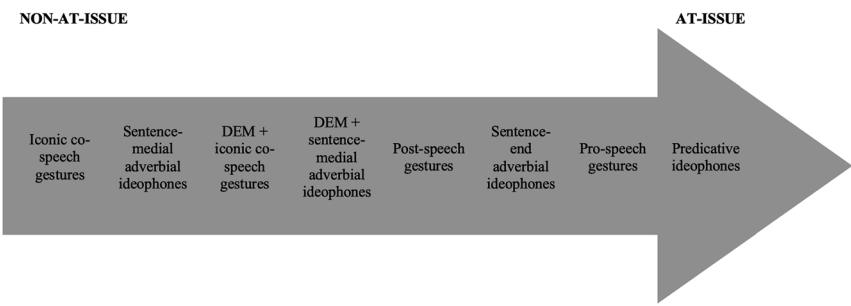

Figure 6: Scalar at-issueness status of iconic enrichments.

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24 Be aware that in this work, we focus on iconic expressions and their information status and Figure 6 makes reference only to these items. We leave it to future work to incorporate other non-at-issue constructions such as appositives into this scale.

In the following sections, we will elaborate on this picture of at-issueness and outline a proposal for the gradient nature of at-issueness that allows us to account for the phenomena we observe.

6 Spelling out gradient at-issueness

We follow Simons et al. (2010) in the assumption that at-issueness is always defined with respect to an overt or covert Question Under Discussion (QUD). Usually, at-issueness is defined as a binary concept: a proposition is either at issue or not. An exception here is Tonhauser et al. (2018), who formulate the following *Gradient Projection Principle* (p. 499).

(57)   **Gradient Projection Principle:** If content C is expressed by a constituent embedded under an entailment-cancelling operator, then C projects to the extent that it is not at-issue.

The principle predicts that the more at issue an utterance content is the less projective it is. While the authors bring experimental support for this principle, they do not formulate a theoretical concept for gradient at-issueness, but point to the connection of speaker commitment and projectivity/at-issueness (p. 498): projectivity is gradient because speaker commitment, which has a decisive influence on the level of at-issueness, is gradient. Here, we want to defend a gradient view of at-issueness along the following lines: at-issueness is a measure of relevance to the QUD. The more relevant a proposition is with respect to a QUD the more at-issue it is. As a consequence, a certain proposition p_1 can be more or less at-issue than another one p_2 in a certain discourse context. And it can be more or less at-issue in one context than in another.

6.1 Gradient relevance to the QUD as a measure of gradient at-issueness

To this end we assume that we can find a relevance metric r that specifies for every proposition p and question Q the degree $r(p, Q)$ that indicates how relevant p is with respect to (the resolution of) Q. This will then allow us to partially order two propositions p, q as $p \leq_Q q$ if $r(p, Q) \leq r(q, Q)$, i.e. q is at least as relevant as p wrt. question Q. We will not go any further into fleshing out the exact implementation of this relevance metric and ordering. A straightforward candidate could be the definition given by Groenendijk and Stokhof (1984, p. 242ff) of a proposition p being 'better' than a proposition q when it comes to resolving Q in a certain context in terms of being more

informative (without being too over-informative) wrt. selecting cells of the underlying partition of Q. Another more recent implementation could be the utility-based definition of propositional relevance wrt. an underlying decision problem of van Rooy (2003).

In other words, we understand at-issueness as the relevance a proposition has for a question, which comes down to the potential of this proposition to (partially) resolve the question. As outlined above, in a given context (with a covert or overt QUD) propositions can be ordered on an at-issueness scale wrt. the degree of relevance they have to resolve a QUD. Given a certain proposition p, which corresponds to the content of some proposition conveyed by an utterance, and a current QUD Q, the degree $r(p, Q)$ is measured wrt. alternative propositions that would also (partially) resolve the QUD. $r(p, Q)$ is relatively low on the scale if there are many other alternative propositions a speaker could have made to resolve the question which are ordered above $r(p, Q)$. $r(p, Q)$ is relatively high on the scale if there are many other alternative propositions which are ordered below $r(p, Q)$. A proposition p then comes with a certain degree of at-issueness on an at-issueness scale in a given context, i.e. with respect to the (covert or overt) current QUD in this context. For the sake of being as concrete as possible, let us assume that $r(p, Q) = 10$ means that 10 % of the alternative propositions a speaker could give in the given context are ordered below p and 90 % above, which would mean that p is rather low on the at-issueness scale or that p is not very relevant to the resolution of the QUD.

We furthermore assume that propositional constructions t, i.e. content components of an utterance such as a verbal main clause, an appositive, a gesture, an ideophone, etc., come with a certain requirement of a minimal degree of at-issueness $a(t)$. Main clause assertions with a relatively high degree of – let us say – 90, co-speech gestures with a very low one of, say, 10. According to the scale in Figure 6, sentence-medial ideophones, co-speech gestures with accompanying demonstratives and sentence-final ideophones with demonstratives, for example, would have to receive values, from lower to higher, between these numbers. Sentence-medial co-speech gestures as well as appositives would have a lower minimal degree value than post-speech gestures or sentence final appositives, respectively, for example. Given this, we can then formulate the following appropriateness condition for an utterance u with content components t_i in a context c.

(58)   **Appropriateness condition for an utterance wrt. at-issueness:**
An utterance u with content components $t_1, \ldots, t_n$ is appropriate in a context c with QUD Q, iff

$$r(\llbracket t_i \rrbracket, Q) \geq a(t_i) \qquad (\text{for all } i = 1, \ldots, n)$$

In other words, an utterance is appropriate in context c, if the relevance of each proposition conveyed by some content component of u is at least as high as the

minimal degree of at-issueness specified by that component. Again, this does not preclude the case that the actual relevance of a component proposition in a context is high, and hence at-issue. All it requires is that it is not lower than the threshold indicated by its construction.

The appropriateness condition accounts for the fact that the current QUD cannot be answered by way of an appositive when at the same time the main clause does not address this question (see e.g. Anderbois et al. 2015). We illustrate this by way of showing that example (1-b) from above is infelicitous in a context where the appositive and not the main clause targets the QUD.

(59)　a.　A: Who do you think is the best musician in town?
　　　　　B: # Maria, **the best musician in town**, came for dinner last night.
　　　b.　A: Who came for dinner recently?
　　　　　B: Maria, **the best musician in town**, came for dinner last night.

In (59-a), the QUD asks for information that is actually given in the appositive, but not in the main clause. The appropriateness condition is not fulfilled, because the main clause assertion is not relevant to the QUD. This is different in (59-b), where the main clause resolves the QUD. It is hence predicted by the appropriateness condition that (59-a) is ruled out, but (59-b) is not. At the same time, it has been pointed out by different authors (cf. Simons et al. 2010 among others) that there are felicitous cases where the appositive addresses the overtly given QUD and the main clause does not. These can, however, be explained by the assumption that there is some other covert QUD present in the discourse, which is addressed by the main clause.[25] Koev (2012) and Esipova (2018) furthermore point out that appositives can happily address one of multiple QUDs. Crucially, this is only possible if the main assertion also addresses one of these QUDs. This case is equally covered by the appropriateness condition. In that case, the appositive would contribute information which is very relevant for one of two current QUDs and hence at-issue to a rather high extent. The following example from Esipova (2018) illustrates this.

(60)　*Context: B just watched a debate between two opponents, after which the audience voted on who was more convincing.*
　　　A:[Who were the opponents]$_{Q1}$ and [how many votes did they get]$_{Q2}$?
　　　B:[The opponents were Uma, [who got 100 votes]$_{A2}$, and Zoe]$_{A1}$, [who got 80]$_{A2}$.

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25 As pointed out by Hans-Martin Gärtner, sometimes these QUDs will arise via accommodation. The question arises whether our mechanism does not then overgenerate and allow for cases that should be excluded, for example (59-a). We do not think this is the case because accommodation is highly constrained and contextually dependent.

In this case there are two questions which are equally salient. For concreteness, we assume that there is always only one current QUD, which is built from all active questions by conjoining them. We can also imagine cases where one active question is more salient than the other. We suggest that the QUD constituents are weighted and when a proposition addresses the more salient question, this results in a higher degree of at-issueness than addressing the less salient one.

The interplay of co-speech gestures and verbal material is a very similar case. It is acceptable for the gesture not to address the current QUD (*QUD 1*), but not for the main assertional verbal material (*QUD 2* and *QUD 2′*). If there are two separate QUDs (*QUD 3a* and *QUD 3b*), the utterance becomes felicitous.

(61)   Peter [went to Greece this summer]_HIKING.[26]
         QUD 1: Where did Peter go this summer?
         QUD 2: Why did Peter go to Greece this summer?
         QUD 2′: What did Peter do in Greece this summer?
         QUDs 3a and 3b: Where did Peter go this summer and what did he do?

6.2 Graded judgements of semantic adequacy

We follow Koev (2012), Anderbois et al. (2015), and others in the assumption that appositives and other material that is traditionally viewed as non-at-issue make a truth-conditional contribution to a joint overall utterance proposition which is evaluated in the actual world. Syrett and Koev (2014) offer experimental evidence that appositives contribute to the truth conditions of the entire sentence, i.e. apparently people assign a joint truth value to a sentence consisting of several propositional components. They show that when people are forced to judge a sentence as true or false, where the appositive contains false material while the main clause material is true, they often judge the entire sentence as false. On the other hand, as mentioned above, research conducted by Kroll and Rysling (2019) showed that speakers' truth value judgements are less impacted by information that appears irrelevant to the current QUD.

In our experiments on the contribution of gestures and ideophones that we outlined above we found that in these settings mismatching gesture or ideophone information impacted speakers' truth value judgements less than mismatching adjective or adverbial information. With the experimental meta-question of how well the description in the video matched the picture it is plausible to assume that

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26 The HIKING gesture can be realized as an observer viewpoint gesture with two fingers moving alternately back and forth and the hand moving forward at the same time.

this constitutes an out-of-blue context without a contentful QUD. In accordance with our concept of graded at-issueness that we outlined above and the appropriateness condition that we introduced, we assume that participants take the form of the experimental items as a clue to generate a QUD Q^* that matches the grade of at-issueness of the involved parts. In other words, co-speech gestures and ideophones are interpreted as less at issue than the (other) verbal parts of the utterances.

We observed that mismatching gestures and ideophones lead to a better rating of the overall utterances than mismatching verbal material. If we take these scaled judgements as representing graded judgements of semantic adequacy (comparable to graded grammaticality judgements, cf. Fanselow et al. 2006; for an account of graded semantic judgements see Waldon and Degen 2020) and pursuing the idea of a graded concept of at-issueness further, this directly brings us to the straightforward assumption that the less at issue a proposition is the less it contributes to the overall (graded) semantic value of the underlying joint proposition evaluated in the actual world. In other words, the joint (graded) truth value $T(u)$ of the overall utterance u is the result of weighting the individual truth values of its component propositions in the actual world w^* by their normalised relevance r (to range between $[0, …, 1]$) wrt. to the constructed QUD Q^*.

$$T(u) = \sum_i \tilde{r}\left(\llbracket t_i \rrbracket, Q^*\right) \cdot \llbracket t_i \rrbracket (w^*)$$

To see the formula at work, consider example (59-b) above and let us assume that the normalized at-issueness of the main clause assertion p_1 with QUD Q, i.e. $r(\llbracket p_1 \rrbracket, Q)$, is 0.9 (the proposition is highly relevant for the current QUD and resolves it) and the normalized at-issueness of the appositive proposition p_2 with QUD Q, i.e. $r(\llbracket p_2 \rrbracket, Q)$, is 0.1 (the proposition is not relevant for the current overt question of who came for dinner, but possibly partially resolves some other question that is still active and is counted in for the current QUD Q). In this case, the resulting joint graded truth value for the sentence in (59-b) would be 1, if both propositions are true and 0, if both are false. If the appositive is false and the main clause true, T(59-b) = 0.9 and if the appositive is true and the main clause false, T(59-b) = 0.1. This way, we receive graded truth values for utterances consisting of multiple propositions. As a formal account, we would still adopt the dynamic unidimensional system of Anderbois et al. (2015) with the only amendment that there are not only two propositional variables p for at-issue material and p^* for non-at-issue material, but variables come with a certain weight according to their degree of at-issueness. All material summed up in the propositional variable $p^{0.6}$ is weighted with 0.6 and contributes accordingly to the joint graded truth value for the complete utterance. EEH and Barnes et al. (2022) build on Anderbois et al. (2015) and suggest a related framework to account for co-speech

gestures and ideophones, respectively. The German demonstrative *so* is treated as a dimension shifter that shifts material from non-at-issue to at-issue. In the framework with weighted propositional variables, as we suggest here, the demonstrative would not act as a dimension shifter, but rather as a 'weight booster'. While usual co-speech gesture material receives a rather small (minimal) default degree of at-issueness, this degree must be much higher for co-speech gestures with accompanying demonstratives.

This would then predict the graded judgements we find in our experiments on gestures and ideophones. An utterance with an adjective consists of only one proposition stemming from the at-issue semantic dimension and false adjectival material leads to the overall judgement that the sentence is false and thus people grade this utterance as very bad in the context of a non-matching picture. Ideophones and gestures constituting more non-at-issue material establish a second dimension and a proposition that is evaluated separately, but with a lower weight of how it is counted in for the final truth value assessment. If the information of this propositional variable turns out to be false this is taken as less severely impacting the truth value judgement. Finally, the experiment testing for gestures with and without accompanying demonstratives showed that gestures that were accompanied by the German demonstrative *so* made a more at-issue contribution than gestures without accompanying demonstrative, but still not in the same way as adjectives. The weight for the separate propositional contribution is boosted by the demonstrative, but this gestural information is still not as at-issue as the material from the main assertion and not fully integrated in its semantic representation.

6.3 Common ground update with different degrees of at-issueness

We propose that the actual degree of at-issueness of a contributing proposition is now relevant for the possible feedback strategies a hearer has and how this affects the CG update. We conjecture that the affirmative or objecting feedback a hearer gives is with respect to the at-issue material, which contributes a rather high degree of relevance. A 'yes'-response leads to the effect that the CG is updated with this at-issue information and this piece of information can then be treated as common ground. As the affirmation does not necessarily target non-at issue information with a relatively low degree of relevance, this part of the utterance does not enter the CG in the same way. Contrary to Anderbois et al. (2015) or Farkas and Bruce

(2010), we believe that the CG is not necessarily updated with non-at issue information that is not already part of the CG.[27] Rather, the hearer checks all new information with their personal knowledge base. For propositions with high relevance the hearer must give some kind of feedback (acknowledgement or objection) and in case of acknowledgement, the proposition will be added to the CG. In case of objection, the discourse is interrupted. For low relevance the hearer can choose to give feedback in form of a 'hey wait a minute'-assertion or a clarification statement such as 'Yes but…'. Then, a new QUD is generated with respect to which the formerly non-at-issue proposition is now at issue, i.e. highly relevant. The hearer can also choose not to react to and ignore a non-relevant proposition, even if the information contradicts their knowledge. In that case, the CG is updated only with the at-issue information of the given utterance and for the speaker it remains unclear whether the non-at-issue information has been accepted and entered the CG or not. This mechanism then accounts for the often observed fact that only at-issue material (or in this gradient view: material with a certain threshold of at-issueness) can be directly assented or dissented to in discourse (cf. examples in (59) and example (4) above).

For future research, we envisage a probabilistic CG update model where the degree of uncertainty as to whether a certain piece of information has been added to the hearer's belief (and then entered the CG) or not is directly correlated to the degree of at-issueness/relevance of the proposition in question. Since a hearer only gives affirmative or objective feedback on propositions of a certain degree of at-issueness, the speaker is left uncertain about the information status of the non-at-issue information parts. Propositions of low relevance can be ignored more easily and it is less likely that the CG is affected by them than by propositions of more relevance for the QUD.

7 Conclusions

This paper has shown how recent research into iconic enrichments has highlighted the problems with a binary understanding of at-issueness. Factors such as the grammatical integration of an item, its temporal and/or structural alignment, how an

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27 Here, we are concerned only with non-presuppositional non-at-issue information stemming from co-speech gestures, ideophones, appositives, or expressives. Presuppositional information has to be part of the CG and has to be assumed to be accommodated if it is not already contained in the CG. How what we propose here can be extended to presuppositions and the relation to different degrees of speaker commitment and whether this can help us better understand the connection between projection and non-at-issueness as discussed in Tonhauser et al. (2018) remains an open issue for now.

item is introduced and the modality in which it occurs can all impact on its at-issueness status. As a result we have proposed an alternative, gradient model of at-issueness, which accounts for the variations in at-issueness status observed between different iconic enrichments and their impact on truth conditions. We then suggested an approach to CG updates using such a model of at-issueness. This in turn allows for a more nuanced understanding of non-at-issue content and its interaction with at-issue content and provides predictions which can guide further experimental work on at-issueness and the factors that influence it.

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