German *zum*-PPs as adjective intensifiers[1]

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Abstract. In this paper, we discuss a type of intensifiers that consists of a combination of the preposition *zum* with nominalised infinitives. We present an exploratory corpus study indicating that besides a small amount of highly lexicalised combinations, all components of the construction exhibit a high degree of flexibility in the material inserted. Based on this observation we argue that this is a productive pattern with some fully idiomatic representatives and propose a compositionally derived meaning constitution. The core meaning components are (i) a comparison of two adjectival properties conceptualised in terms of tropes, (ii) an attitudinal evaluative component and (iii) a modal operator accounting for non-referentiality effects of the internal PP-argument.

Keywords: compositionality, modification, intensifiers, trope semantics, corpus study, lexicography, multiword expressions

1. Introduction

German *zum*-PPs with nominalised infinitives (NI), which are frequently used in written as well as in spoken texts and quite a few of which are treated as fixed expressions by most general dictionaries, typically exhibit two[2] common usage types in German language. The first usage type is in the predicative function in connection with the copula *sein* (to be):

(1)   a.   zum   Schreien sein
            to-the scream$_{NI}$ be
            'to be very funny'
        b.   zum   Niederknien sein
            to-the kneel-down$_{NI}$ be.
            'to be very impressive/remarkable'

In the second usage type, they function as intensifiers of adjectives:

(2)   a.   zum   Schreien komisch
            to-the scream$_{NI}$ funny
            'very funny'

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[2]It is possible that a third usage type, an adverbial one, exists. We consider it to be marginal both in frequency and grammaticality compared to the two reported usage types.

  b. zum Niederknien schön
    to-the kneel-down$_{NI}$ beautiful
    'very beautiful'

Although many *zum*-PPs exhibit both readings, dictionaries tend to document only one of them, particularly the predicative usage. The complication of the alignment of both usage types in lexicography seems to be connected with the semantic properties of the *zum*-PP intensifiers, because on the one hand, they can form fixed expressions together with certain adjectives, while on the other hand, they show a high degree of flexibility by combining with a variety of different adjectives. This property is a challenge for both lexicography and semantics, since it is not always clear whether the constructions with a *zum*-PP as intensifier are fixed, lexicalised metaphors (such as typical idioms) or compositionally reconstructable expressions.

From the lexicographic, or to be more precise phraseographic, perspective there are two primary challenges or issues one has to deal with, while treating this phenomenon. First, the formulation of the lemma or the basic form of the expression can be problematic, because it is not always clear whether an adjective should be a part of the lemma or not. Second, intensifiers would often be paraphrased with such generalised expressions as 'very' or 'extremely'. This broad definition might be misinterpreted as synonymity based on similarities that *zum*-PPs share: the same syntactic pattern and pragmatic function. This kind of general definition can also suggest a much wider range of use than the respective expression allows for. Therefore, it is necessary to decide whether and in which cases a specialised additional definition should be applied.

Due to these properties, the construction is also interesting from the point of view of theoretical semantics. It evokes the following research questions:

(RQ1) To what extent is the meaning constitution of *zum*-intensifiers modifying adjectives compositional?

(RQ2) If this is true, what is their common core meaning?

During our work as lexicographers in the project *Center for Digital Lexicography for the German Language* (ZDL)[3], we came across a variety of *zum*-PP intensifiers. Knowing that their intensifying reading is quite often underrepresented in dictionaries, we document both readings of the expression in the dictionary entries in *The Digital Dictionary of the German Language* (DWDS)[4] by splitting the meanings according to their function as shown in the third reading of the dictionary entry for *zum Schreien* in figure (2). This method enabled us to highlight and clarify the intensifier usage of *zum*-PPs, which this contribution focuses on.

For the paraphrase of the intensifier usage of *zum*-PPs, we applied such words as *sehr* ('very'), *äußerst* ('extremely') or *in hohem Maße* ('highly'). This complies with the lexicographic requirements to a definition, for example such as seamless substitutability of lemma in the corpus examples or illustrative examples.

Nevertheless, looking at the third reading with its standardised definitions from the semantic point of view brings us to the questions, which are related to the issues listed above: how interchangeable are *zum*-PPs? For example, can *zum Greifen* ('to grab') be used as an intensifier instead of *zum Schreien* ('to scream')? Another related question would be: how far should a

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[3]www.zdl.org
[4]www.dwds.de

lexicographer go with listing up references to the related expressions of the same pattern? For example, should one refer to the expression *zum Bersten* ('to burst') in the dictionary entry for *zum Schreien*? Both definitely share an intensifying reading, but are they semantically related?

zum Schreien

Grammatik   Mehrwortausdruck
Aussprache   🔊
Bestandteile   ↗ schreien

Bedeutungsübersicht   [+]

1. [umgangssprachlich] sehr lustig; so komisch, dass man vor Lachen schreien könnte
2. [umgangssprachlich] so schrecklich, empörend, unerträglich, dass man aufschreien möchte
3. [umgangssprachlich, verstärkend] sehr, äußerst, in höchstem Maße

Bedeutungen   [ZDL-Vollartikel]

1. **umgangssprachlich**   sehr lustig; so komisch, dass man vor Lachen schreien könnte

    siehe auch **zum Brüllen** (1), **zum Schießen** (1)

    KOLLOKATIONEN:

    als Prädikativ: **zum Schreien** sein

    als Adverbialbestimmung: etw. **zum Schreien** finden; **zum Schreien** aussehen

    BEISPIELE:

    Er trug eine Art goldene Karnevalsjacke, eine Kasperlekrawatte und fürchterlich enge Cowboystiefel. N[…] sah **zum Schreien** aus. [Süddeutsche Zeitung, 03.03.2006]

2. **umgangssprachlich**   so schrecklich, empörend, unerträglich, dass man aufschreien möchte

    siehe auch **zum Heulen** (1)

    KOLLOKATIONEN:

    als Prädikativ: **zum Schreien** sein

    BEISPIELE:

    Zum Schreien: »Keine Frau auf dieser Position« *[Überschrift]* Wir wollen keine Frau – ein klarer Fall von Diskriminierung. Von diesem Absagegrund erzählte ein Personalberater der Bewerberin, sie erhielt 8.500 Euro von der Firma. [Der Spiegel, 10.05.2014 (online)]

3. **umgangssprachlich, verstärkend**   sehr, äußerst, in höchstem Maße

    Grammatik: vor Adjektiven

    siehe auch **zum Brüllen** (2), **zum Heulen** (2), **zum Schießen** (2)

    KOLLOKATIONEN:

    als Adverbialbestimmung: **zum Schreien** komisch, schön, lustig

    BEISPIELE:

    Ich war etwa elf Jahre alt, als ich »Die Ferien des Monsieur Hulot« von Jacques Tati zum ersten Mal gesehen habe, und ich fand ihn schon damals **zum Schreien** komisch. [Der Tagesspiegel, 29.06.2001]

Figure 1: Dictionary entry from dwds.de for *zum Schreien*, a customised view[5]

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[5]The original entry was manually customised for space reasons; to view the full version of this dictionary entry

In order to find solutions for the above-mentioned challenges, we proceeded in two methodological steps: First, we conducted an explorative corpus study aimed at the determination of the flexibility boundaries of the intensifying *zum*-PP construction. The corpus data indicate that the construction is flexible in the combination of the involved meaning components. In a second step, we investigated the combinatorial properties of the components from the perspective of descriptive semantics. Both methodological steps inform our understanding of the construction and feed into a formal modeling of the meaning constitution.

Our study is focused on analyzing the internal relations within the *zum*-PP-adjective phrase and comparing different types of *zum*-PPs and their intensifier property. The study has the following structure. In section 2 we present the criteria for our explorative corpus study and the primary evaluation of the results. In section 3 we discuss some descriptive data on the construction that determine the semantic contribution of the meaning components. Building on the observations from the corpus and the descriptive data, we propose a model for the compositional reconstruction of the interpretation of *zum*-PP intensifiers. In 4, we draw conclusions and identify some questions for future research.

2. Overview of the corpus study and query results

We conducted our corpus study in the freely available part of the corpus *Referenz- und Zeitungskorpus*[6]. This corpus comprises several subcorpora with texts from a variety of daily and weekly newspapers, fiction and non-fiction prose and scientific works published in German language and covers not only texts from the current and past centuries, but also text material which dates back to the 15th century.

We restricted our query to the first 18 years of the 21st century. The query term was based on the following pattern: the string *zum* followed by a token with the part of speech tag NN (noun) and its last characters corresponding to the German infinitive endings and a following adjective in a predicative function.[7] Based on the given criteria, our query yielded over 1000 hits. The subsequent review and manual filtering out of the irrelevant examples[8] resulted in 541 respective examples which are relevant to our study and form the basis of our subcorpus. Firstly, we have analyzed the frequencies of the *zum*-PP and adjective occurrences. The query results reveal approximately 129 different combination examples in our subcorpus. Table 1 shows the 11 most frequent of them.

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please visit the following link: https://www.dwds.de/wb/zum%20 Schreien

[6]The corpus is hosted by www.dwds.de

[7]See appendix for exact query terms

[8]As the corpus does not include syntactic annotations, our surface-oriented query also yielded sentences in which the *zum*-PP did not function as intensifier, cf. (i) or did not feature an infinitive as internal argument, cf. (ii).

(i)   Es gibt Menschen, die nehmen zum   Kochen grundsätzlich überhaupt nichts,   was fix und fertig
       It gives people   who take   to-the cooking generally   *particle*   nothing that fix and ready
       aus   der Flasche kommt.
       from the bottle   comes.
       'There are people who generally do not use anything coming as processed food from a bottle for cooking.'

(ii)   Ab   September   ist dann eine Aufbauqualifizierung   zum Personalreferenten   möglich.
       From September on is then a   additional qualification to the head of human resources possible.
       'Starting September, the supplemental qualification for becoming an HR officer will be available.'

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zum-PP expression		occurences
zum Greifen nah(e)	'so close that one could grab it'	193
zum Verwechseln ähnlich	'so similar that one could mistake them'	126
zum Zerreißen gespannt	'so tense that it could tear'	24
zum Bersten voll	'so full that it could burst'	15
zum Heulen schön	'so beautiful that one could whine'	9
zum Schneiden dick	'so heavy that one could cut it'(referring to air)	8
zum Schreien komisch	'so funny that one could scream'	7
zum Sterben schön	'so beautiful that one could die'	7
zum Anfassen nah	'so near that one could touch it'	7
zum Weinen schön	'so beautiful that one could cry'	6
zum Niederknien schön	'so beautiful that one could kneel down'	5

Table 1: *zum*-PP phrases with ≥ 5 occurrences in the subcorpus

Expectedly, the first two expressions *zum Greifen nah* and *zum Verwechseln ähnlich* exceed the number of occurrences of the rest of *zum*-PP and adjective combinations by a substantial margin, which is interesting regarding their rigid, inflexible structure: *zum Greifen* and *zum Verwechseln* extremely rarely intensify other adjectives than *nah* or *ähnlich*.

Our subcorpus contains further 122 combinations with relatively low frequencies: 14 combinations appear between four and two times, 108 represent single time occurrences with such examples as *zum Mitnehmen schön* ('so beautiful that one could/wants to take it with them'), *zum Schreien präzis* ('so precise that one could scream') or *zum Platzen wütend* ('so furious that one could burst') and others.

Secondly, we divided the identified combinations in their respective constituents by extracting the *zum*-PP and the respective adjective from each example and subsequently examined the relation between both entities. We identified 82 unique *zum*-PP intensifiers within our subcorpus.

zum-PP expression		modified adjectives
zum Weinen	'to cry'	finster und einsam ('dark and lonely'), **schön** ('beautiful') gut ('good'), traurig ('sad'), komisch ('funny') vertraut ('familiar'), kompliziert ('complicated'), zart ('tender/soft'), langweilig ('boring')
zum Bersten	'to burst'	einfallsreich ('inventive'), gut gelaunt ('cheerful'), überfüllt ('overcrowded'), **voll** ('full')
zum Heulen	'to whine'	einfach ('simple'), **schön** ('beautiful'), traurig ('sad'), witzig ('funny')
zum Niederknien	'to kneel (for)'	gut ('good'), idyllisch ('idyllic'), köstlich ('exquisit'), **schön** ('beautiful')
zum Verzweifeln	'to despair'	ähnlich ('similar'), gering ('low'), komisch ('funny'), originalgetreu ('true to the original'), radikal ('radical'), schön ('beautiful')
zum Schreien	'to scream'	blöd ('stupid'), **komisch** ('funny'), präzis ('precise')
zum Sterben	'to die'	langweilig ('boring'), lecker ('tasty'), **schön** ('beautiful')

Table 2: frequent *zum*-PP intensifiers with the adjectives they apply to

Approximately 20 of them appear with (semantically) different adjectives, while the rest modify one particular adjective in our examples. Table 2 exemplifies several salient combinations, where the intensifier applies to more than one adjective. In bold print are the adjectives that appear five or more times in the respective combination in our subcorpus.

During our study, we also paid attention to the behaviour of the adjectives modified by the *zum*-intensifiers. Our subcorpus reveals 74 different adjectives. Those of them that are modified by five or more intensifiers are listed in Table 3 (highlighted in bold print).

adjective		***zum*-PP**
schön	'beautiful'	zum Abheben ('to get off the ground'), zum Abwenden ('to turn away'), zum Bellen ('to bark'), zum Einschlafen ('to fall asleep'), zum Gruseln ('to get horrified'), zum Halsverrenken ('to crane one's neck'), **zum Heulen** ('to whine'), zum Kotzen ('to puke'), zum Mitnehmen ('to take with you'), **zum Niederknien** ('to kneel down'), zum Reinschlagen ('to hit'), zum Schmelzen ('to melt'), zum Schwärmen ('to daydream'), zum Seufzen ('to sigh'), **zum Sterben** ('to die'), zum Träumen ('to dream of'), zum Verzweifeln ('to despair'), **zum Weinen** ('to cry'), zum Werben ('to advertise')
komisch	'funny'	zum Beeimern ('to laugh oneself silly'), **zum Brüllen** ('to scream'), zum Kreischen ('to scream'), zum Kringeln ('to bend/crook/curl up'), **zum Schreien** ('to scream'), zum Schütteln ('to shake'), zum Verzweifeln ('to despair'), zum Weinen ('to cry')
nah(e)	'close/near'	zum Anfassen ('to touch'), zum Berühren ('to touch'), zum Betreten ('to enter'), zum Fressen ('to eat away'), zum Greifen ('to grab'), zum Reinbeißen ('to bite'), zum Schnappen ('to snap'), zum Stechen ('to sting')

Table 3: adjectives frequently intensified by different *zum*-PPs phrases

Based on our corpus analysis, we can formulate the following interim conclusions:

1. The construction *zum*-PP and adjective is highly productive. Beside the lexicalised *zum*-PPs like *zum Heulen*, *zum Schreien* or *zum Niederknien*, which are typically listed in dictionaries (as a predicative or an intensifier) there are quite a few new formations, which obviously arose spontaneously and exhibit a unique character. For example: *zum Dahinschmelzen köstlich* ('so delicious that one could melt away'), *zum Bellen schön* ('so wonderful that one could bark') or *zum Zähneziehen süß* ('so sweet that one's teeth could be pulled out').

2. Lexicalised, fixed realisations of the *zum*-PP and adjective construction are rare. The following are the most common of them: *zum Greifen nah(e)* ('so near that you could grab it'), *zum Verwechseln ähnlich* ('so similar that one could mistake them'), *zum Schneiden dick* ('so heavy that one could cut it' referring to air), *zum Bersten voll* ('so full that it could burst') and *zum Zerreißen gespannt* ('so tense that it could tear' mainly referring to nerves or feelings). These expressions allow a very low to none level of exchangeability of the adjective. Other *zum*-PPs are more flexible concerning the adjectives they modify.

3. Both constituents of the construction exhibit high variance, although there is a tendency for almost every salient *zum*-PP intensifier to combine with a particular adjective (or a group of adjectives) more frequently than with other adjectives.

3. A compositional reconstruction of *zum*-intensifiers

The three interim conclusions we derived from our explorative corpus study serve as a basis to assume that compositional processes are involved in the combination of *zum*-PPs and their adjectival target arguments. The high variability in the combination of *zum*-PPs with adjectives indicates that the meaning constitution has to be transparent at least for those combinations beyond the most frequent ones. Furthermore, we saw that all instances of the *zum*-intensifiers introduce an intensifying meaning. We take this to be the common core of the representatives of the construction, but will argue that the meaning of *zum*-intensifiers cannot be reduced to mere intensification.

If composition is the process driving the meaning constitution of *zum*-intensifiers, we have to understand the contribution the individual components of the construction make to the overall meaning. The key to the meaning will be the contribution of the preposition *zu(m)* relating the adjective and the NI.

3.1. The relation between adjective and NI

There are three observations determining the relation between the adjective and the NI. We will refer to them as (i) conceptual compatibility, (ii) hyperbolic interpretation, and (iii) non-referentiality.

The first observation concerns the combinatorial restrictions for the two components of the construction. The respective meanings of the NI and the adjective must be conceptually compatible. They have to be combined in a way that allows the inference of a causal or otherwise plausible relation between the adjectival property and the event denoted by the NI. Consequently, it is not possible to combine any adjective with any NI arbitrarily. This is illustrated by the examples (3) and (4) which show that the elements of the *zum*-PP are not arbitrarily interchangeable. Instead, a plausibility restriction seems to apply.[9]

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[9]The examples in (3) are of course constructed, but the *zum*-PPs are partially taken from authentic corpus examples and combined with different adjectives.

(3) a. Die Straßenbahn ist #zum   Gähnen / #zum   Greifen / #zum   Abheben
         The tram   is #to-the yawn$_{NI}$ / #to-the grasp$_{NI}$ / #to-the take-off$_{NI}$
         voll.
         crowded.
     b. Der Ort   ist #zum   Platzen / #zum   Dünnbleiben / #zum   Niederknien   öde.
         The place is #to-the burst$_{NI}$ / #to-the stay-thin$_{NI}$ / #to-the kneel-down$_{NI}$ dull.

(4) a. Die Straßenbahn ist zum   Verzweifeln / zum   Kopfschütteln voll.
         The tram   is to-the despair$_{NI}$ / to-the shake-head$_{NI}$ crowded.
     b. Der Ort   ist zum   Davonlaufen / zum   Einschlafen / zum   Gähnen öde.
         The place is to-the run-away$_{NI}$ / to-the fall-asleep$_{NI}$ / to-the yawn$_{NI}$ dull.

In (3a) for instance, the crowdedness of the tram does not have a plausible relation to the events of yawning, grasping or taking off. In (4a) in contrast, there is a conceptually plausible relation between the tram being crowded and becoming despaired or shaking one's head, as these are conceivable reactions to a crowded tram. The inferred plausible relation would therefore be a causal one where the tram being crowded causes a becoming despaired or shaking head event. Parallel observations hold true for the contrast pairs in (3b) and (4b). We remain agnostic about the question whether causality is the only plausible relation to be inferred.

If the way in which NI and adjective are combined follows conceptual restrictions, the meaning contribution of the overall *zum*-PP cannot be limited to the intensifying component. It is not a mere synonym for *sehr* 'very', as commonly assumed in dictionaries. Otherwise, the NI would be freely interchangeable so long as combined with a gradable adjective. We label this observation **conceptual compatibility**.

Beyond mere conceptual compatibility between NI and adjective, the event denoted by the NI has to meet further restrictions. The NI denotes an event which represents a conceptually plausible, yet extreme degree with regard to the modified adjective, as illustrated by the examples in (5).

(5) a. Der Film   war #zum   Lächeln komisch.
         The movie was #to-the smile$_{NI}$ funny.
     b. Der Film   war zum   Tränenlachen komisch.
         The movie was to-the laugh-tears$_{NI}$ funny.

The NI *Tränenlachen* ('laughing tears') in example (5b) is much better suited for combining with the adjective *komisch* ('funny') in comparison to *Lächeln* ('smile') in (5a). In principle, this is not expected if the adjective and the NI only have to meet the requirement of conceptual plausibility, as smiling would be a conceptually plausible reaction to something being funny. Nevertheless, (5a) is odd. This is because *Tränenlachen* depicts a strong reaction to the funniness of the movie. In contrast, *zum Lächeln* in (5a) does not properly convey the intensifying meaning of the *zum*-PP, as smiling is not an extreme or strong reaction to the movie's funniness, whereas laughing tears is. Based on this observation, we assume that in addition to conceptual compatibility with the adjective, the NI has to denote an extreme reaction event with respect to the adjectival property. We propose to refer to this phenomenon as a **hyperbolic interpretation**, as the reaction encoded in the NI is an extreme one compared to the adjectival property that evokes it.

Our third observation concerns the **non-referentiality** of the NI. The *zum*-PP does not give rise to the entailment or even the presupposition that the NI-event is instantiated. This is surprising given the fact that the NI is embedded in a DP headed by a definite determiner usually giving rise to an existential presupposition. This means that even though the NI denoting a screaming event in (6) is headed by a definite determiner, the first clause of the sentence does not entail that someone actually screamed. It is even compatible with the negation of a screaming event as expressed in the second clause.

(6)   a.   Der Film   war zum   Schreien komisch, aber da   wir die Kinder nicht
            The movie was to-the scream$_{NI}$ funny,   but because we the kids   not
            wecken wollten, haben wir natürlich nicht geschrien.
            wake   want   have we of course not   screamed.
            'The movie was so funny that we could have screamed, but as we did not want to wake the kids, we did not actually scream.'
       b.   Die Straßenbahn war zum   Platzen voll,   aber natürlich ist sie nicht wirklich
            The tram   was to-the burst$_{NI}$ crowded, but of-course is it   not   really
            geplatzt.
            burst.
            'The tram was so crowded that it could have burst, but of course it did not really burst.'

The explanation in the *aber*-clause does not yield a contradiction, although this would be expected considering the definite determiner. This effect suggests that the DP featuring the NI behaves in a way that corresponds to weak definites (Aguilar-Guevara and Zwarts, 2010; Carlson et al., 2006). Whereas the first proposals on weak definites have been centering around arguments, weak definite DPs have also been shown to occur in head-adjacent modification. Maienborn (2011) and Maienborn et al. (2016) discussed such effects for stative passives and Lukassek (2015, 2020) for eventive *mit*-modifiers. All these cases have in common that the modifier has access to the conceptual information of its target argument and by combining with it builds a new, *ad hoc* concept.

The fact that the preposition and the article are contracted further supports this line of reasoning. According to the weak definite DP view, weak DPs do not introduce a specific referent. A sentence like (7), means that Ida goes to some school or rather that Ida is a student, but no concrete school is introduced into the discourse. The referent of the DP is an abstraction over schools.

(7)   Ida geht zur   Schule.
       Ida goes to-the school.
       'Ida goes to school.'

As compelling as this explanation may seem at first sight, it does not really catch the essence of (8). The definite DP here does not only not refer to a specific screaming event. It does not refer to any event in the real world at all, as we have seen from the negation of the screaming event in (6). That is, the sentence is fully compatible with a world in which no event of screaming happens at all. Such negations are impossible with weak definite DPs.

(8)   Der Film war zum Schreien komisch.
      the movie was to-the scream_{NI} funny.
      'The movie was so funny that one could scream.'

Crucially, the effect that the NI does not refer to an actually instantiated event cannot be attributed to the definite article being merged with the preposition. Contraction of a preposition with the following definite article is a systematic process taking place with the prepositions *an* ('at', 'to'), *bei* ('next to', 'close to') and *zu* ('to') in combination with definite articles in singular form. With NIs, this process is obligatory. However, contracted determiners do not systematically fail to give rise to existential presuppositions, cf. the contradiction in (9), where referentiality is presupposed.

(9)   a.   #Ich habe zum Würzen schwarzen Pfeffer benutzt, aber ich habe das Essen
           I   have to-the season_{NI} black   pepper used,   but I   have the food
           nicht gewürzt.
           not   seasoned.
           'I used black pepper for seasoning, but I did not season the food.'
      b.   #Ida ist am   Schwimmen, aber sie schwimmt nicht.
           Ida is at-the swim_{NI},   but she swims   not.
           'Ida is swimming, but she is not swimming.'

This means that the non-referentiality cannot be explained by general mechanisms having their source in the process of contraction. Instead, they are specific to *zum*-intensifiers.

The explanation we suggest involves modality. An indication of the presence of a modal operator can be found in paraphrases of sentences like (8) that we suggested over the course of the paper. It can be paraphrased as 'The movie was funny to such a high degree that one could scream', but not as 'The movie was funny to such a high degree that one screamed'. Based on the intuitions from the paraphrases, it is plausible to assume that the preposition *zu* introduces a covert modal operator. That analysis has a precursor in Martin et al. (2021). From this point of view, the lack of referentiality in the definite DP is merely understood as non-referentiality in the real world.

3.2. Modeling *zum*-intensifiers

We now have an overview over the interpretative effects *zum*-intensifiers evoke. Next, we have to describe the structural and ontological determinants. The internal argument of *zum* in the given reading is an event denoting noun. The preposition *zum* requires this noun to be a nominalised infinitive. As an approximation, we assume that nominalised infinitives denote events and refrain from a detailed discussion of its semantic representation, but refer to Lübbe and Trott (2017) for a more elaborated view on the semantics of nominalised infinitives.

As we have seen, the NI does not introduce an actual discourse referent. Nevertheless, the conceptualisation of the event can be further enriched with information stemming from the direct sentential context. In the examples presented in (10), the sentential context is always a copular construction in which the *zum*-intensifier targets the predicative adjective. There are no hard-wired structural restrictions concerning the participants of the NI-event. However, by

means of pragmatic inferences the relation between the event and the holder of the adjectival property, i.e. the subject referent[10], can be specified. For instance, in (10a) the tram is the THEME of the bursting event. In (10b) the subject referent of the sentence is a plausible SOURCE for the event denoted by the NI. In (10c) the strawberries are the GOAL of an event of biting into something denoted by the NI. However, it is also possible that the subject referent does not fill any thematic role in the NI-event at all, as in (10d).

(10)   a.   Die alte gelbe Tram ist zum Platzen voll.
              The old yellow tram is to-the burst$_{NI}$ crowded.
              'The old yellow tram is so crowded that it could burst'

        b.   Der Ort   ist zum Davonlaufen öde.
              The place is to-the run-away$_{NI}$ dull.
              'The place is so dull that one could run away.'

        c.   Die Erdbeeren sind zum Reinbeißen   rot.
              The strawberries are   to-the bite-into-them$_{NI}$ red.
              'The strawberries are so red that one cannot resist to eat them.'

        d.   Der Sonnenaufgang ist zum Sterben schön.
              The sunrise   is to-the die$_{NI}$ beautiful.
              'The sunset is so beautiful that one could die.'

The external argument of *zum* is an adjectival property. Two influential models have been proposed for the semantics of gradable adjectives in the recent years: degree semantics (Kennedy and McNally, 1999, 2005; Schwarzschild, 2005) and trope semantics (Moltmann, 2007, 2013; Maienborn, 2019).

According to Kennedy and McNally (2005: p. 349), "gradable adjectives map their arguments onto abstract representations of measurement, or degree, which are formalised as points or intervals partially ordered along some dimension." I.e., a gradable adjective introduces a degree argument into the discourse universe. When this argument is bound during composition, a standard of comparison is established. In the absence of any suitable modifier, the standard will be contextually determined in the positive. Alternatively, modifiers like *very*, *extremely* or *relatively* can set the standard.[11]

Moltmann (2009) raises the problem that the ontological status of degrees is unclear. For gradable adjectives describing the size of an object like *long* in (11a), ordered scales are interpreted quite naturally. In contrast, there is no natural scale for many other adjectives describing physical properties of objects although they do belong to the gradable class like *tearproof* in (11b).

(11)   a.   The rope is five meters long.
        b.   *The rope is fifty kilos tearproof.

The intensifiers we are investigating in this paper would be candidates for a standard setting modifier in the degree semantics sense. However, we see two problems in this way of understanding *zum*-intensifiers. First, *zum*-intensifiers do not introduce a natural measure associated with the lexically given scale of the modified adjectives. While they do in fact set some sort of extreme standard of comparison, this standard does not seem to be a point on a quantifiable

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[10]Depending on the exact syntactic embedding of the construction this can also be some other syntactic function.

[11]In the comparative and the superlative, this is managed via the respective morphemes and comparison phrases.

scale. Second, *zum*-intensifiers featuring different nominalised infinitives cannot be ordered on a scale. The order between the *zum*-intensifiers in (12) is not evident, i.e. there is no clear intuition about their equivalence or ordering.

(12)　　Die Tram ist zum　Platzen / zum　Bersten　/ zum　Haareraufen　　voll.
　　　　The tram　is　to-the burst$_{NI}$ / to-the explode$_{NI}$ / to-the tear-one's-hair$_{NI}$ crowded.
　　　　'The tram is so crowded that it could burst / that it could explode / that one could tear one's hair.'

We therefore conclude that the degree modeling of adjectival intensifiers is not suitable for *zum*-intensifiers. Instead, we follow Moltmann (2009) in assuming a trope semantics for gradable adjectives. On this view, adjectives denote tropes, i.e. property manifestations on a holder. Ontologically, tropes are classified as concrete objects. Most prominently, they function as referential arguments of adjective nominalisations, but are in Moltmann's understanding also present in the lexical semantics of adjectives. Due to their concreteness, they can function as an anchor argument of modifiers of different types, among them adjectival itensifiers.

Crucially, tropes manifest themselves in different degrees and manners that are not restricted to specific ordered scales, but can be conceptualised in all sorts of dimensions. They are variable concrete objects. Furthermore, they can be compared with regard to their quality. Moltmann (2009) models comparability with an *exceed*-relation between tropes of the same kind manifested in different holders or in the same holder at different points in time. The *exceed*-relation requires its trope arguments to belong to the same comparative concept, i.e. the same conceptual knowledge associated with a trope. The relation comes into play both in trope denoting nouns and adjectives, cf. (13).

(13)　　a.　The beauty of the rose exceeds the beauty of the orchid.
　　　　b.　The rose is more beautiful than the orchid.

In (13), two tropes are compared explicitly by the use of either the verb *exceed* or the comparative marker *more*. We argue that *zum*-intensifiers feature a covert trope comparison. We will model it in terms of a lexically introduced *exceed* relation. I.e. (14) is understood as a state in which the beauty of the rose exceeds the degree of beauty that would be sufficient for the rose's beauty to entail a crying event.

(14)　　Die Rose ist zum　Heulen schön.
　　　　The rose　is　to-the cry$_{NI}$　beautiful.
　　　　'The rose is so beautiful that one could cry.'

More explicitly, *zum*-intensifiers introduce an *exceed*-relation in Moltmann's sense between two tropes, the referential one stemming from the adjective that is targeted by the intensifier and an implicit one functioning as a comparison standard. The implicit one is modeled in terms of a threshold that the adjectival property has to exceed in order to be grammatically combinable with the *zum*-intensifier.

The *exceed*-relation will function as the central meaning contribution of *zum*-intensifiers. However, there are two other semantic components we have to account for. The first one is the hyperbolic interpretation that we described in section 3. The hyperbolic interpretation is a subjective meaning component. *Zum*-intensifiers are a means to express a subjective evaluation of the extent to which an adjectival property holds in a property bearer. This extent is evaluated

as extreme. I.e. when a speaker uses a *zum*-intensifier, she expresses her attitude towards the extent to which the adjectival property holds of the subject argument.[12] For instance, in (15) it is the speaker of the sentence who evaluates the funniness of the movie as extremely high.

(15) Der Film   ist zum   Schreien komisch.
      The movie is to-the scream$_{\text{NI}}$ funny.
      'The movie is so funny that one could scream.'

In order to anchor the speaker's attitude in the semantics of *zum*-intensifiers, we fall back upon attitudinal objects (Moltmann, 2014). They are structured in terms of a relation that specifies the type of attitude involved. In our case this is the attitude of finding something extreme. The relation holds between a referential attitudinal object, an attitude holder, which is standardly the speaker in *zum*-intensifier contexts, and the object of the attitude, i.e. the content towards which the speaker has an attitude. In our case this is the adjectival trope, or more specifically, the extent to which it holds of the subject referent. The object of the attitude is determined by the PP's syntactic position. *Zum*-intensifiers are AP modifiers. The referential argument of the AP is their syntactic anchor argument and therefore the target of the attitude.

The second component that we have to account for is the non-referentiality of the nominalised infinitive. In section 3.1, we saw that the nominalised infinitive does not introduce a referent into the discourse universe. As a consequence, negating the occurrence of the event does not lead to a contradictory utterance. In order to account for this observation, we adopt an idea from Martin et al. (2021), who discuss the directional reading of *zu(m)*. They show that goal-PPs in combination with motion verbs do not always entail that the goal has been reached, contrary to what was traditionally assumed in the literature, cf. Haselbach (Haselbach) for German *zu* and Piñón (1993) and Smith (1997). Based on psycholinguistic evidence on the cancellability of the implication in sentences like (16), Martin et al. (2021) propose a modeling for directional *zu*-PPs in terms of a modal operation embedding the goal.

(16) This morning Ziggy drove to Berlin, but he never actually arrived there.
      (Martin et al., 2021: 10, (16a))

They propose a semantics of directional PPs like *to Berlin* featuring a necessity operator that embeds the last part of the directed path including the goal, cf. the semantic form in (17).

(17) to Berlin $\leadsto \lambda V \lambda \theta \lambda x \lambda e \lambda p \lambda w.V_w(e) \wedge \theta_w(x,e) \wedge$ trace(e)=p $\wedge \exists q[p \leq q \wedge q(1) =$ location$_w$(berlin) $\wedge \Box_{\alpha_w}^{w'}(\exists e'[V_{w'}(e') \wedge \theta_{w'}(x,e') \wedge$ trace$(e \oplus e') = q])]$
      (Martin et al., 2021: 11, (18))

In a nutshell, the directional PP *to Berlin* maps a motion partially to a path *p* that is a part of a path *q* with the goal Berlin. The reaching of the goal is embedded under a necessity operator. Whether the world *w* is a part of the set of words *w'* in which the goal is reached is not determined by the preposition's semantics, but a matter of context and therefore pragmatics. We will follow this line of argumentation for *zum*-intensifiers.

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[12]This is again simplified to cases where the *zum*-intensifier modifies a predicative adjective. Of course, the structural configuration would be a bit different in cases where the adjective is predicated over the direct object like in *Das berücksichtigt nicht so was wie Das finde ich zum Schreien komisch.* The semantic effect of subjectivity is the same.

Similarly to directional *to/zu*, the intensifying *zum*-phrase allows for cancelling the entailment that the event referred to by the nominalised infinitive is instantiated. More precisely, the non-realisation is even the default, due to the hyperbolic meaning component in *zum*-intensifiers. This can be illustrated by the fact that with the directional interpretation, asserting that the goal was reached is somewhat odd because it is redundant, whereas for the intensifying *zum* this is a genuine gain of information.

(18)　　a.　?Wir segelten zur　Insel　und sind　dort　angekommen.
　　　　　　　We　sailed　　to the island and be$_{aux}$ there arrive.
　　　　　　　'We sailed to the island and arrived there.'
　　　　b.　Die Rose ist zum　Heulen schön　　und ich habe geweint, als　ich sie sah.
　　　　　　　The rose　is to-the cry$_{NI}$　beautiful and I　have cried,　when I　it　saw.
　　　　　　　'The rose is so beautiful that one could cry and I cried when I saw it.'

This is evidence for the fact that the modal operator in the intensifier reading is weaker than in the directional reading. Whereas in the directional reading reaching the goal is a necessity in all worlds w', in the intensifying reading the instantiation of the PP-internal argument it is only possible, but not necessary.

To summarise, the lexical semantics of intensifying *zum* has three meaning components. It introduces a comparison between two tropes where one of the tropes is an implicit comparison standard and the other is contributed by the external argument of the preposition, i.e. the modified adjective. The extent to which this trope holds is evaluated as extreme by the speaker. Therefore, the semantics features an existentially bound speaker variable that is to be specified contextually. The characterisation of the comparison standard trope is embedded under a possibility modal. Our proposal for the lexical semantics is presented in (19).

(19)　　$[\![zu_{intensifying}]\!] = \lambda e \lambda A \lambda x \lambda w \exists t \exists t' \exists a : \exists s_i.\ A_w(t)(x) \wedge t \geq t' \wedge \text{find-extreme}_w(a, s_i, t) \wedge$
　　　　$\Diamond^{w'}_{\alpha_w} (A_{w'}(t')(x) \wedge inst_{w'}(e))$

The intensifying preposition *zum* takes an event e, an adjectival property A with its referential, existentially bound trope argument t, a property holder x and a world w as arguments. *Zu* introduces a trope threshold t' that functions as a standard of comparison and an attitude a. The preposition presupposes a speaker s_i. The meaning of *zu* has four components. The first conjunct is the adjectival predicate A with its arguments to be specified upon composition with the external argument. Furthermore, intensifying *zu* comes with a comparison of trope extent t with threshold t'. The third conjunct is the attitude predicate *find-extreme* accounting for subjective evaluative meaning of the modifier. The possibility modal in the fourth conjunct embeds the instantiation of the event e to be specified by the internal argument of the preposition.

The proposed lexical semantics builds the base for deriving the meaning of *zum*-intensified APs compositionally. First, the lexical semantics of intensifying *zu* combines with the nominalised infinitive in (20a) to yield (20b) as the semantics of the prepositional phrase.

(20)　　a.　$[\![das\ Heulen]\!] = \text{def-}h\ [\text{cry}(h)]$
　　　　b.　$[\![zum_{intensifying}\ Heulen]\!] = \lambda A \lambda x \lambda w \exists t \exists t' \exists a : \exists s_i.\ A_w(t)(x) \wedge t \geq t' \wedge$
　　　　　　$\text{find-extreme}_w(a, s_i, t) \wedge \Diamond^{w'}_{\alpha_w} (A_{w'}(t')(x) \wedge inst_{w'}(\text{def-}h\ [\text{cry}(h)]))$

In the next step, the PP semantics is combined with the adjectival target argument modeled in terms of a trope. The semantic form for *schön* ('beautiful') is given in (21a) and the combination of the PP with the adjective in (21b).

(21)   a. $[\![$schön$]\!] = \lambda t \exists r.$ beautiful$(t) \wedge B(t,r)$

          b. $[\![$zum$_{intensifying}$ Heulen schön$]\!] = \lambda x \lambda w \exists t \exists t' \exists a : \exists s_i.$ beautiful$_w(t) \wedge B_w(t,x) \wedge t \geq t' \wedge$ find-extreme$_w(a,s_i,$ t$) \wedge \diamond_{\alpha_w}^{w'}($beautiful$_{w'}(t') \wedge B_{w'}(t',x) \wedge inst_{w'}($def-*h* [cry$(h)$]$))$

Finally, the AP is combined with the subject referent. We ignore the intricacies of the copular construction and refer the reader to the modeling of trope based adjective semantics within copular constructions in Maienborn (2019). The resulting sentence meaning ignoring a representation of tense properties is presented in (22).

(22) $[\![$Die Rose ist zum Heulen schön.$]\!] =$
    $\exists!r \; \exists t \exists e \exists t' \exists a : \exists s_i.$ beautiful$_w(t) \wedge B_w(t,r) \wedge$ rose$(r) \wedge t \geq t' \wedge$ find-extreme$_w(a,s_i,$ t$)$
    $\wedge \diamond_{\alpha_w}^{w'}($beautiful$_{w'}(t') \wedge B_{w'}(t',r) \wedge inst_{w'}($def-*h* [cry$(h)$]$)$

The meaning representation of the sentence in (22) can be paraphrased as the state of the rose exhibiting an extent of beauty considered as extreme by the speaker and that is higher than the extent of beauty in a rose that could evoke a crying event.

Our proposal allows for a compositional meaning constitution of APs modified by a *zum*-intensifier. It accounts for the three observations we presented in section 3: First, the conceptual content of the nominalised infinitive is part of the *zum*-intensifier's semantics and accounts for the fact that *zum*-intensifiers are not freely interchangeable. This covers the observation on **conceptual compatibility**. Second, the **hyperbolic interpretation** is captured via the attitudinal component. Third, the nominalised infinitive is embedded under a modal operator, which prevents it from being strictly referential and accounts for the third observation on **non-referentiality** we reported.

4. Conclusion

Starting out from a lexicographic perspective, we identified *zum*-intensifiers as a challenging group of expressions both for the documentation in dictionaries and for theoretical semantics. For lexicography, they are problematic due to their different degrees of lexicalisation. As a consequence, decisions concerning the choice of a base form and a suitable paraphrase are intricate. In order to arrive at a more systematic understanding of the group of expressions, we investigated the two research questions arising from the the initial lexicographic problem. The first one concerned the way in which the meaning of combinations of *zum*-intensifiers with adjectives arises and the second one the division between common core meaning and the contribution that the components of the construction make to the overall interpretation.

Our corpus study showed that the representatives of the construction under discussion are situated on a spectrum between almost complete lexical fixedness and a high degree of flexibility. This has consequences both for our understanding of the processes that underlie meaning constitution and for the lexicographic documentation of the construction.

We developed a model of the meaning constitution that accounts for the flexible representatives

of the group. In our model, *zum*-intensifiers have three central meaning components: (i) a comparison between a property and a contextually set standard conceptualized in terms of a relation between two tropes; (ii) an attitudinal component accounting for effects of subjective evaluation and (iii) a modal component that captures effects of non-referentiality. Crucially, our model reconstructs the meaning of *zum*-intensifiers fully compositionally.

Concerning the challenges occurring in lexicographic documentation, we were able to show that the combinations of *zum*-PP and adjective are complex formations with very different levels of fixedness. Therefore, there is no universal solution for their documentation in dictionaries. As a consequence, choosing a basic form of the expression for a dictionary entry should be based on a corpus analysis. Fully lexicalised constructions (such as *zum Greifen nah*) should be documented with the respective adjective. In other, more variable cases, the paraphrases should account for the impact the specific NI has on the meaning. This is where our model for the meaning constitution of *zum*-intensifiers can help to formulate systematic paraphrases.

The intensifiers we discussed in this paper are a means to express a specific attitude towards a particular property in a referent. This would presumably make them a linguistic expression typical for rather informal, personal registers. This is mirrored in the dwds.de-entry for *zum Schreien*, cf. figure (2), and other representatives of the construction where all usage types of the prepositional phrase are marked as colloquial. However, in our exploratory corpus study we saw that examples of *zum*-intensifiers occur in articles from different subsections of newspapers, mainly in reports on cultural events, but also in historical pieces or political discussions. In order to arrive at a full understanding of the usage of *zum*-intensifiers, it will be necessary to evaluate corpus data that is balanced according to registers. A future study should investigate whether *zum*-intensifiers can in fact be considered to be register sensitive.

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Appendix: Search queries

- Query results for "zum *en with $p=NN $p=ADJD", from the core corpus (Kernkorpus), das Digitale Wörterbuch der deutschen Sprache, <https://www.dwds.de/r/?h=1&corpus=kern&from=wb&q=zum+*en+with+%24p%3DNN+%24p%3DADJD>, retrieved on 2021-09-03.

- Query results for "zum *ln with $p=NN $p=ADJD", from the core corpus (Kernkorpus), das Digitale Wörterbuch der deutschen Sprache, <https://www.dwds.de/r/?q=zum+*ln+with+%24p%3DNN+%24p%3DADJD&corpus=kern&h=1&from=wb>, retrieved on 2021-09-03.

- Query results for "zum *rn with $p=NN $p=ADJD", from the core corpus (Kernkorpus), das Digitale Wörterbuch der deutschen Sprache, <https://www.dwds.de/r/?corpus=kern&q=zum%20*rn%20with%20%24p%3DNN%20%24p%3DADJD>, retrieved on 2021-09-03.