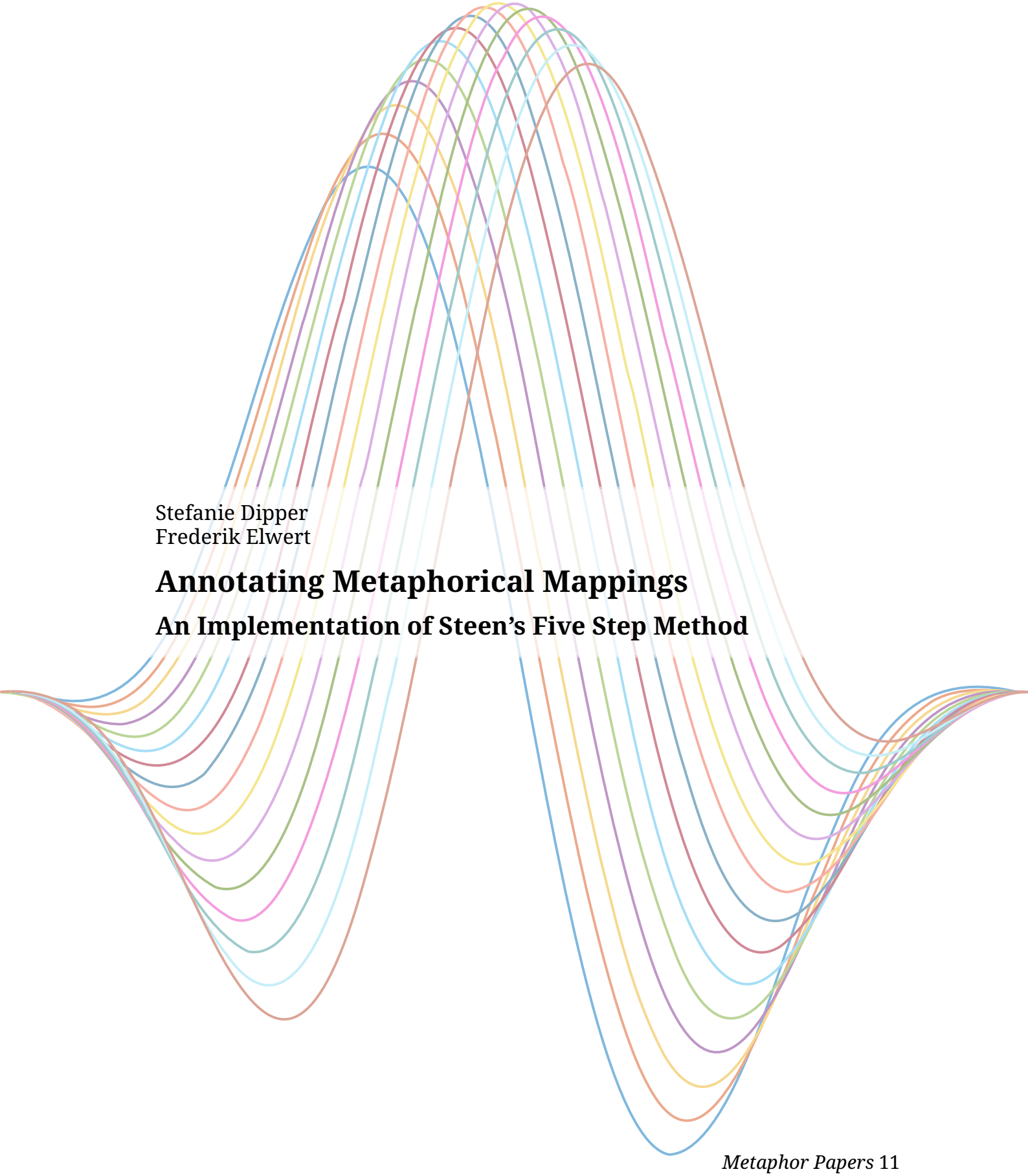

Stefanie Dipper
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An Implementation of Steen's Five Step Method

Metaphor Papers 11

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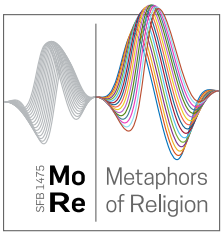

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Annotating Metaphorical Mappings

An Implementation of Steen's Five Step Method

Stefanie Dipper
Department of Linguistics, Ruhr University Bochum

Frederik Elwert
Center for Religious Studies, Ruhr University Bochum

ABSTRACT This paper presents an implementation of the Five Step Method first proposed by Gerard J. Steen. It shows the utility of the method for annotating metaphorical language and the underlying conceptual mappings in religious texts from different cultural and linguistic contexts. A number of adjustments to the original method are introduced to make the method more accessible and guide annotators from various disciplinary backgrounds. After introducing the general procedure, a number of edge cases are discussed and possible ways of dealing with more complex metaphors are presented.

KEYWORDS metaphor annotation, conceptual mapping, conceptual metaphor theory, Five Step Method

Introduction

Metaphor, in its most basic form defined as a 'mapping across two conceptual domains' (Steen 2007, 11), is a ubiquitous phenomenon in language. Beyond simply being a means of expression, it also has been described as a central feature of human thought and world-construction, which is expressed in the notion of "conceptual metaphor" (Lakoff and Johnson 1980). In combination with language and thought, metaphor is also involved in communication, which Steen (2011) identifies as a third dimension. This function of metaphor is especially crucial for religious communication, which is the subject of our investigations in the Collaborative Research Center (CRC) "Metaphors of Religion": Religious concepts in many cases cannot, by their very nature, be conveyed using literal language. [1]

The Divine *transcends* (or "rises above and beyond") the limits of human [2]

> thought and language, which are seen as containers too small to contain such a huge and high object (corresponding to an immensely important and powerful concept). However, if people have a communal concept of the Divine, they will need to talk about it. So, to talk about the transcendent and the ineffable, Judeo-Christian practitioners and thinkers have traditionally had recourse to metaphor—as have members of many other religious traditions […]. (Dancygier and Sweetser 2014, 208–9)

Metaphor thus fulfills a special role in religious language, where its capacity to express ideas about an abstract entity with reference to a well-known concrete entity works as a means to make statements about the transcendent.[1] This can be illustrated using an example from a religious text. In Example (1), an extract from a sermon in Middle High German, the metaphor SALVATION IS HEALING is used to convey religious ideas: abstract theological notions such as original sin ("Adam's sin") and salvation are mapped onto a more tangible domain by referring to the concepts of wounding and healing. Understanding the function of metaphor in religious texts requires not only the identification of metaphors, but also their interpretation, i.e., the analysis of the conceptual mapping that is used to communicate ideas about a religious topic. [3]

(1) ſo vnſir herre got alle die wnden virbindit die wir íe von adameſ ſvndon gefrvmeton [4]
'Thus our Lord God binds up all the wounds we have suffered through Adam's sin.'[2]

The CRC 1475 "Metaphors of Religion," in which this work is situated, investigates the role of metaphor in religious language across time and space. In this context, we developed an annotation scheme for metaphor interpretation. The CRC 1475 brings together researchers from a variety of disciplines, from linguistics to the social sciences, religious studies and different area studies. Thus, it is not only interested in the linguistic part of metaphor use, but also in its social and cultural meaning as a communication device. What is more, the studied material varies in age and language. This requires a methodology that works on material from different historical as well as linguistic contexts. These conditions also determine the role of annotation: The aim is to make acts of textual interpretation explicit and map linguistic phenomena onto a shared conceptual and methodological framework. Consequently, the aim is not necessarily to create easily reproducible annotations with high inter-annotator agreement. Still, annotations need to be systematic enough to be helpful as a basis for further analyses with methods from computational linguistics (e.g., automated metaphor identification), social sciences (analysis of interpretative patterns) and philological hermeneutics. [5]

The main contribution of this paper is an annotation scheme for metaphor interpretation, which implements the method described by Steen (2007). The scheme guides the annotators through the individual steps of the analysis and provides a rigorous and transparent format that makes it easy to identify the cross-domain mapping. [6]

1 See Krech, Karis, and Elwert (2023) for further elaboration of the conceptual framework of the CRC.
2 Source: Züricher Predigten, from around 1200 (text M171 of the Reference Corpus of Middle High German: https://www.linguistics.rub.de/rem/corpus/texts.html).

Related Work

Annotation of textual material is a foundational technique in scholarship. In computational linguistics, annotations are fundamental for creating gold standard data that can be used for training and evaluation of automated systems. The (digital) humanities have their own tradition of annotation that reaches back way into the history of writing: Here, annotations are less aimed at creating agreeable information, but at making interpretations explicit and explaining certain readings of a text passage (Caria and Mathiak 2020). [7]

In metaphor studies, annotation is crucial to mark metaphorical language use. In 2007, an interdisciplinary research group published guidelines for a Metaphor Identification Procedure (MIP) with the aim of improving the comparability of findings (Pragglejaz Group 2007). According to these guidelines, metaphors are identified as follows: First, the complete text is read to be clear about the meaning and intention of the text. Then, the annotator goes through the text word by word, determines the meaning of a word in the given context, and then checks whether another "more basic" contemporary meaning exists for that word in other possible contexts. "Basic" is roughly defined as more concrete or historically older. If such a more basic meaning exists, there must be a contrast between this meaning and the current meaning in the context (this rules out cases of polysemy), but at the same time it must be possible to understand the contextual meaning in comparison with the more basic one (this rules out homonymy). If these conditions are met, the word is annotated as metaphorical. Pragglejaz Group (2007) use the example in (2) to illustrate the application of the guidelines. For instance, the word *struggled* in this context "indicates effort, difficulty and lack of success in achieving a goal," and there is indeed a more basic meaning: "to use one's physical strength against someone or something" (Pragglejaz Group 2007, 5), which contrasts with the contextual meaning. At the same time, abstract effort can be understood in comparison with physical effort, so the word *struggled* is used metaphorically in Example (2). [8]

(2) For years, Sonia Gandhi has struggled to convince Indians that she [...]. [9]

The guidelines essentially assume an idealized native speaker with complete knowledge of the language of a particular period. Hence, annotators are advised to use external resources such as dictionaries, especially to look up basic word senses. [10]

The MIPVU guidelines (Metaphor Identification Procedure Vrije Universiteit) went beyond MIP by also taking into account explicit comparisons or similes, which they call direct metaphor (Steen et al. 2010). Explicit comparisons are marked by expressions such as *like, as, compared to*. In contrast to indirect metaphor, the referents of a direct metaphor are constructed literally, so the words marked accordingly are not used figuratively themselves. Nevertheless, they represent an instance of metaphor, insofar as they also involve mapping between two domains. Example (3) shows an instance of direct metaphor: The words *doctor* and *patient* are not used figuratively, but by the means of comparison with the analyst and business, they are part of a cross-domain mapping. [11]

(3) An effective analyst provides the same service to the business as the doctor provides to the patient. (Steen et al. 2010, 14:27) [12]

Another extension concerns the binary classes of MIP: MIPVU introduces a third class for borderline cases, called WIDLII ("When in doubt, leave it in"). [13]

Recently, guidelines were published that adapt MIPVU for the identification of metaphor in languages other than English (Nacey et al. 2019). In the context of CRC 1475, Artemov et al. (2024) built on this work and discuss specific challenges when dealing with metaphor identification in historical texts. [14]

The DMIP guidelines (Deliberate Metaphor Identification Procedure, Reijnierse et al. 2018) are based on the Deliberate Metaphor Theory (DMT, Steen 2017), which defines deliberate metaphors as those that are intentionally used *as* metaphor, excluding dead and conventionalized metaphor. Such metaphors draw attention to the cross-domain mapping, as opposed to conventionalized metaphors where no such processes take place. According to the DMIP guidelines, deliberate metaphor includes novel metaphor and extended metaphor, consisting of multiple words that relate to the same metaphor. Further indicators of deliberate metaphor are lexical signals for direct metaphors, such as *like, as*. Example (4) shows a case of deliberate metaphor, taken from a news report about television trends. While *gallop* can also be understood as a conventionalized metaphor for fast movement, its use in a phrase about western movies re-vitalizes its horse-related meaning and thus draws attention to the cross-domain mapping. [15]

(4) It is premature, then, to say that the western has galloped back to centre screen. (Reijnierse et al. 2018, 139) [16]

Until today, the comprehensive and detailed guidelines of MIP and MIPVU are standard references for corpus-based annotation in this field. These guidelines deliberately limit themselves to the *identification* of metaphorical language. They do not describe methods for metaphor *interpretation*, e.g., finding a conceptual structure that informs a concrete linguistic expression. For this purpose, Steen (2007) proposed the **'Five Step Method'**, which he also used in recent work on deliberate metaphors (Steen 2017).[3] This method forms an integral part of our scheme and we describe the five steps in detail, using an example from Steen (2007) for illustration, see example (5), which is taken from a poem by Alfred Tennyson. Since Steen's formal representations are somewhat idiosyncratic, we supplement them with more common versions in footnotes. [17]

(5) Now sleeps the crimson petal. [18]

3 While Steen relates his five steps method to the idea of conceptual metaphors in the sense of Lakoff and Johnson (1980), the result of this method is not necessarily identifying one particular conceptual metaphor like "argument is war". Rather, Steen talks of "conceptual structures" or "conceptual mappings" that inform a concrete linguistic expression (see e.g. Steen 2011).

The five steps that give the method its name are then as follows: [19]

1. **Identification of metaphor-related words:** Metaphorically-used words are identified according to the MIP/MIPVU method. [20]

   Example: In Example (5), only the verb *sleeps* is used metaphorically. [21]

2. **Identification of propositions:** Linguistic expressions are transformed into conceptual structures in the form of a series of propositions. The propositions are numbered consecutively (`P1`, `P2` etc.) and, for verbs, are given in the form: `(Relation Argument)` or `(Relation Argument1 Argument2)`, where the relation is provided by the verb (e.g. `SLEEP`), and for modifiers in the form: `(MOD Modified-Element Modifier)`.[4] For example, the adverb `NOW` modifies the proposition `P1` by describing its temporal location. The use of capitals indicates that the entities involved in the propositions are conceptual (semantic) entities rather than linguistic entities (words). The subscript s indicates that the expression is interpreted metaphorically, i.e., the corresponding concept relates to the domain from which the metaphorical expression originates, the so-called source domain. The subscript t indicates that the expression is understood literally, and the concept relates to the target domain (Lakoff and Johnson 1980). [22]

   Example: [23]

   P1 (SLEEP$_s$ PETAL$_t$) [24]
   P2 (MOD P1 NOW$_t$)
   P3 (MOD PETAL$_t$ CRIMSON$_t$)

3. **Identification of open comparison:** Propositions that relate to both the source and target domains are split into two mono-domain propositions, each incomplete with open slots. The open slots are indicated by variables, which represent the missing predicates and arguments. For example, the proposition `P1` is split into two open propositions: in the first, the relation is open (represented here by the variable F), in the second, the argument is open (a). Since each proposition is now only located in one domain, the subscripts s and t can be attached to the end of the proposition.[5] [25]

   Example: [26]

$$\begin{aligned}\textsc{sim}\{&\exists F \exists a\\ &\big[F\big(\textsc{crimson petal}\big)\big]_t\\ &\big[\textsc{sleep}(a)\big]_s\}\end{aligned}$$

4 A more common representation of the propositions would be: `Relation(Argument)` or `Relation(Argument1, Argument2)` or `MOD(Modified-Element, Modifier)`. The propositions would then look like this:
P1: SLEEP$_s$(PETAL$_t$)
P2: MOD(P1, NOW$_t$)
P3: MOD(PETAL$_t$, CRIMSON$_t$)

5 From here on, Steen uses the alternative form of representation in which the relation is noted before the parenthesis. The square brackets are added so that the subscripts can refer to the entire proposition. Steen has also added the modifier back to the noun *petal*: `CRIMSON PETAL`.

The underlying assumption is that the two open propositions are similar to each other and that there are correspondences between the components. This is expressed by the similarity function SIM$\{Q, R\}$, which compares the two open propositions Q and R to each other. The existential quantifiers $\exists F$ and $\exists a$ indicate that there is (*exists*) some state F that applies to CRIMSON PETAL (and is similar to SLEEP), and there is some entity a which SLEEPs (and is similar to CRIMSON PETAL).[6] Since the SLEEP proposition is labeled as source domain, the similarity has to be projected from this proposition towards the PETAL proposition. [27]

4. **Identification of analogical structure:** The open slots are interpreted by the analyst by searching for 'the logically most encompassing candidate' (Steen 2007, 18) (which can be different depending on the analyst's intentions). For instance, an obvious candidate that could sleep would be a human being, so the analyst might replace the variable a by HUMAN. Another plausible option would be ANIMAL. This way, the propositions are transformed into a closed comparison in the form of an analogy, i.e., the predicate F becomes BE-INACTIVE, and the entity a becomes HUMAN. [28]

   Example: [29]

$$\text{SIM}\{\big[\text{BE-INACTIVE}\big(\text{CRIMSON PETAL}\big)\big]_t \quad \big[\text{SLEEP}\big(\text{HUMAN}\big)\big]_s\}$$

5. **Identification of cross-domain mapping:** The corresponding arguments are read of the parallel propositions, e.g. HUMAN corresponds to CRIMSON PETAL. Further correspondences can be added, which could project additional, implicit elements of the sleeping schema (from the source domain) to the crimson petal schema (on the target domain). For instance, the sleep's goal, namely resting, can be projected to the target domain and become the goal of being inactive. Or the typical time of sleeping (at night), could be projected to the target domain and trigger inferences when the being inactive takes place. [30]

   Example: [31]

   SLEEP > BE-INACTIVE [32]
   HUMAN > CRIMSON PETAL

   inferences: [33]

   GOAL OF SLEEP > GOAL OF BE-INACTIVE: REST [34]
   TIME OF SLEEP > TIME OF BE-INACTIVE: NIGHT

This method provides a thorough and controlled way to identify the conceptual mappings involved in a given metaphorical expression. For this purpose, it turns the attention from the linguistic expression itself to the conceptual structure of the statement, its 'text base' (Steen 2007, 17). However, its formal notation that reminds of analytical philosophy [35]

6 The correspondences could be noted as follows: $F_t \sim \text{SLEEP}_s$ and $a_s \sim \text{CRIMSON PETAL}_t$.

makes it unnecessarily complicated to be used by researchers with diverse disciplinary backgrounds. Also, the propositions derived in step 2 are not limited in their structure, making them at the same time expressive and difficult to identify in a controlled way.

Our annotation scheme addresses these issues and transforms Steen's five step method into a procedure that is suitable for the systematic annotation of larger quantities of texts in a collaborative research setting. [36]

Annotation Scheme

The comparative study of religious metaphor use across different textual traditions requires a detailed annotation procedure that does not only mark metaphors where they occur, but also gives access to their communicative function. For this purpose, the conceptual mapping and the semantic domains involved in it have to be identified as well. Additionally, the concrete words in a given language have to be linked with concepts in a language-independent semantic resource in order to allow for cross-linguistic comparison of metaphor use. [37]

In this section we introduce our annotation scheme and illustrate its application with Example (6), taken from a sermon in Modern German. In the second part, we discuss selected complex examples. [38]

(6) Skelette von Hochhäusern ragen rechts und links in den Himmel. [39]
'Skeletons of skyscrapers rise into the sky on the right and left.'[7]

The annotation procedure comprises the seven steps listed below, which are explained in detail in the Sec. "A First Example". Steps 1–4 and 6 correspond to the Five Step Method of (Steen 2007), but were adjusted to match the requirements of our research group. [40]

1. **Mark metaphor-related words**: Highlight metaphor-related words (MRW) within the text [41]
2. **Extract metaphor-related propositions**: Translate into formal propositions those parts of the context that directly affect the marked MRW
3. **Fill table with open metaphorical comparison**: Transfer relevant parts of the proposition(s) into a table
4. **Complete the analogical structure**: Fill the remaining cells of the table
5. **Revise steps 2–4**: If necessary, generate further propositions which are not explicitly stated in the text and go back to step 2
6. **Extract metaphorical mappings**: Identify cross-domain mapping
7. **Link with thesaurus**: Link the elements of the mapping to concepts in a semantic resource/thesaurus

As in the MIP guidelines, the annotators first read the entire text and make sure they understand the content. Then they go through the text once more and determine word [42]

7 Source: Stephanie Höhner, https://predigten.evangelisch.de/predigt/wenn-truemmer-zum-trost-werden-predigt-zu-jesaja-6610-14-von-stephanie-hoehner.

by word if it is a *metaphor-related word* (MRW). As in the MIPVU guidelines, we also consider as MRWs similes which are explicitly signaled by words such as *like* or *as*.

Not all metaphor-related words are relevant for religious communication. Especially highly conventionalized metaphors do usually not contribute to religious meaning. Thus, annotators can choose to annotate only a subset of all MRW-marked words in more detail. Here, we focus mostly on deliberate metaphors. We identify as deliberate those metaphors which are either explicitly signaled, or are new creations (in contrast to conventionalized metaphors), or are conventionalized metaphors which are revitalized, e.g., in that the metaphor is carried on and elaborated in the following context. [43]

A First Example

In this section, we show in detail how the seven steps of our annotation scheme work, using Example (6) from above. [44]

1. Mark Metaphor-Related Words

In Example (6), the word *Skelette*, 'skeletons', is the only MRW. When the annotators have identified and marked one or more MRWs, they also mark the complete phrase containing the MRWs as a metaphorical phrase and start the in-depth analysis procedure. Annotators can additionally provide a translation into English to aid the interdisciplinary collaboration. The MRWs are also marked in the translation (underlined in the example). [45]

> Skelette von Hochhäusern ragen rechts und links in den Himmel.
> Skeletons of skyscrapers rise into the sky on the right and left.

2. Extract Metaphor-Related Propositions

All propositions that are directly relevant to the MRW are extracted from the sentence. To aid annotators, we limit propositions to four basic forms, properties, relations, possession, and type, in the following format:[8] [46]

Property:	A	*has/have the property*	Prop		
Relation:	A	*has/have the relation*	Rel	*to*	B
Possession:	A	*possesses*	B		
Type:	A	*is/are of type*	Type		

In order to determine which propositions are "directly relevant" to the MRW, first words are considered that are in a direct or close dependency relation to the MRW. That is, if the MRW is the main verb, first its subject and object and its modifiers are considered. [47]

8 Initially, we modelled "possession" as a relation as well. But due to the frequent appearance of possession, that can also be expressed through various linguistic means, we decided to add it as a separate type. We understand "possession" here in a very broad sense, including abstract possession as expressed, e.g., through various grammatical possessive constructs.

If the MRW is a noun, noun modifiers are considered, as in the present example. For the given example, there is just one such proposition. The *of*-PP denotes a possessor relation, so the proposition that corresponds to *skeletons of skyscrapers* is of type "possession". Since this proposition is explicitly expressed in the sentence, it is marked as "explicit" in the annotation.

Possession:	Skyscrapers	*possess*	skeletons	(explicit)

The aim of this step is to break down the information contained in the sentence into individual parts, consisting of minimal information units. This makes it easier to reduce the metaphor to the really relevant elements, thus simplifying the analysis. [48]

The difference between the different types of propositions is not always clear-cut. For instance, in the example above, one could alternatively extract a "property" proposition of the form: "Skyscrapers *have the property* have-skeletons". It depends on the current context whether it is rather about one element and its (complex) property or about two elements which are in relation to each other. [49]

3. Fill Table with Open Metaphorical Comparison

In this step, the concepts from the propositions in step 2 are inserted into different cells of a table. The table contains a row for expressions that are part of the target domain, and a row for expressions that are part of the source domain. The columns encode the different "slots" and are filled by the individual arguments of the propositions (i.e., the concepts denoted above by "A", "B", "Prop", "Rel", and "Type"). [50]

In our example, the cell in the upper left corner contains the expression which is understood literally (*skyscrapers*). The cell in the lower right corner contains the MRW (*skeletons*). The example deals with a possession proposition, which is here expressed with the verb "have" entered in the central cells. (If the proposition was in form of a property or type, the columns would be named differently.) [51]

	A	**Rel**	**B**
Target domain	Skyscrapers	have	
Source domain		have	skeletons

The table makes the open aspects of the metaphorical comparison explicit. Steen (2007) uses logical formulae which are only partially specified and contain variables as arguments, which represent the open aspects of the metaphor. We think that the table form is more transparent and easier for the annotators to fill than logical formulae. It also facilitates analysis and interpretation of the metaphor, see the next steps. [52]

4. Complete the Analogical Structure

The next step is to try to fill the blanks in the table. A test question for the blank cell in [53]

the source domain row is: “Who/what would normally have that property/stand in that relation?” In our example this would be the question “Who/what does normally have a skeleton?” The answer could be “humans.”[9]

A test question for the blank cell in the target domain row is: “What is actually meant by the expression?” This can be answered by paraphrasing the expression, e.g. in our example in the form “Skyscrapers have a support structure.”[10] We fill the corresponding cells with these inferred concepts, indicated here by angle brackets. [54]

	A	**Rel**	**B**
Target domain	Skyscrapers	have	<support structures>
Source domain	<Humans>	have	skeletons

If the cells are filled in correctly, it should be possible to read them from top to bottom, i.e., column by column, and read the comparisons of the table: “Skyscrapers are like humans” and “Support structures are like skeletons.” In addition, one could try to determine one or several *tertia comparationis*, by asking “In which way/sense are skyscrapers like humans?” and “In which way are support structures like skeletons?” One could answer the second question as follows: “Both serve to keep their ‘owner’ upright.” [55]

	A	**Rel**	**B**
Target domain	Skyscrapers *are like*	have	<support structures> *are like*
Source domain	<Humans>	have	skeletons

5. Revise Steps 2–4

Next, the annotators validate the comparisons that can be read of the table and ask themselves whether the comparisons and *tertia comparationis* reflect the metaphor appropriately. If this is not the case, they go back to step 2 and revise the analysis. In such a revision one usually exploits additional propositions that are not explicitly mentioned in the phrase under study but can be known from the broader textual context or from world knowledge. [56]

In this example, the initial analysis is not satisfying. The identified mapping is correct, but it does not fully capture the nuance of its use. The analysed text is about the destroyed city of Aleppo, Syria. It is clear from the local context that we are dealing with destroyed skyscrapers. On the basis of this contextual knowledge (or even without this additional knowledge) one can conclude that something quite different than “keep upright” is [57]

9 The answer might as well be “animals” or rather “vertebrates.” The broader context of this example suggests that “humans” fits better than “animals.”

10 As religious metaphors are used to make statements about transcendent realities that at times evade human language, this step can be particularly tricky. As a consequence, it will not always be possible to fill this row.

relevant here: That one can see skeletons/support structures ("rise into the sky") is not normally the case. We know from world knowledge that with humans (and animals), if we can see their skeleton this means that they are already dead and that they lack the parts (organs, muscles) essential to life.

We therefore return to step 2 and add the corresponding propositions, marked as "implicit" and "context" information, respectively. [58]

Possession:	Skyscrapers	*possess*	skeletons	(explicit)
Property:	Skeletons	*have the property*	visible	(implicit ["rise"])
Property:	Skyscrapers	*have the property*	destroyed	(context)

Now the information of the propositions have become more complex: the two arguments of the relation—skyscrapers and skeletons—both have additional properties, A′ and B′. We combine this information in the table by providing multiple slots for complex arguments.[11] [59]

Relation	**A′**	**A**	**Rel**	**B′**	**B**
Target domain	Destroyed	skyscrapers	have		
Source domain			have	visible	skeletons

The test question for the source row is now: "Who/what does normally have a visible skeleton?" And the answer is "dead humans." A paraphrase of the target row could be: "Destroyed skyscrapers have visible support structures." This gives us the following revised filled table: [60]

Relation	**A′**	**A**	**Rel**	**B′**	**B**
Target domain	Destroyed	skyscrapers	have	<visible>	<support structures>
Source domain	<Dead>	<humans>	have	visible	skeletons

Comparisons that can be read of this table include: "Destroyed skyscrapers are like dead humans" but also "destroyed is like dead" and "skyscrapers are like humans." In the table, identical information in the cells of a column (here: "visible") often hints at the *tertium comparationis* as the common part of the comparison. Here, the *tertium comparationis* is "Destroyed skyscrapers are like dead humans in that their support structures/skeletons are visible." [61]

6. Extract Metaphorical Mappings

Finally, the annotators list all cross-domain mappings and the *tertia*. [62]

11 If in the revision step further relations rather than simple properties have been added, it is often more appropriate to distribute the information on several tables than to increase the number of slots, see Sec. "Complex Examples" for an example.

SKYSCRAPERS ARE LIKE HUMANS
DESTROYED IS LIKE DEAD
SUPPORT STRUCTURES ARE LIKE SKELETONS
Tertium: visible

7. Link with Thesaurus

In order to enable the comparison of annotations from different times and cultural areas, the concepts found are standardized at the end. For this purpose, the annotators link the concepts from step 6 to a shared semantic resource or thesaurus. This resource organizes concepts independent of concrete linguistic forms in a hierarchical structure of domains and subdomains. We evaluated multiple resources as a potential starting point for such a thesaurus. In the end, we chose the Semantic Domains project (SemDom, SIL International n.d.) as a starting point for our own semantic thesaurus. Based in linguistic fieldwork, its domains are designed to work across different cultural contexts, and we found it less skewed towards the Western cultural area than other comparable resources.[12] Another benefit is that it is available under a Creative Commons license (CC BY SA), which allows us to make adjustments where they appear to be necessary. [63]

In the following table, the concepts from the annotations are each enriched with IDs which uniquely reference the corresponding concepts in SemDom. The referenced concepts can be located at different levels in the SemDom tree, and thus are placed at different levels of abstraction. Additionally, some concepts are best described as an intersection of different domains, rather than a single entry from the thesaurus. [64]

Concept	**SemDom Concept**
Skyscrapers	Building
Humans	Person
Destroyed	Destroy
Dead	Die
Support structures	Support
	Parts of a Building
Skeletons	Bone, Joint

Complex Examples

This section presents selected examples from religious texts we have studied. The examples illustrate different aspects of the proposed procedure. [65]

12 Before settling on SemDom, we used the Historical Thesaurus of English (HTE, Kay et al. 2009) in earlier tests. While it is quite detailed and well structured, we found its focus on Christianity and a Western view on religion made it difficult to adapt it for our comparative purposes.

Similes

Example (7), which is a Bible quotation (Isa. 66:14) from the same source as Example (6), contains a simile, i.e., a metaphor signalled explicitly by *wie* 'like'. [66]

(7) euer Gebein soll grünen wie Gras [67]
your bones shall green like grass
'your bones shall flourish like the grass'

The MRW is *grünen* '(to) green'. In fact, *Gebein* 'bones' is not understood literally here either, but stands for human beings or, more generally, for the people. This is a metonymy rather than a metaphor, because there is no domain switch. We decided to capture metonomy as separate propositions in these cases, so that metonymical mappings can be resolved before further analysis. The directly related propositions are then: [68]

Property	Grass	*has the property*	greening	(explicit)
Property	Bones	*have the property*	greening	(explicit)
Metonomy	Bones	*stands for*	people	(implicit)

Transferring the propositions to the table results in the following incomplete table: [69]

	A		**Prop**
Target domain	People	are	
Source domain	Grass	is	greening

In similes it is often the case that more cells are already filled in this step than with implicit metaphors (here, the lower left cell is already filled by "grass"). The upper right cell can be filled by "growing." Then the conceptual mappings are: [70]

PEOPLE IS LIKE GRASS (in that …)
… GROWING IS LIKE GREENING

Multiple Relations

Example (1) from above contains multiple MRWs, which result in several metaphor-related propositions: [71]

Thus our Lord God binds up all the wounds we have suffered through Adam's sin.

God	*has the relation*	bind up	*to*	wounds	(explicit)
We	*possess*	wounds			(explicit)
Sin	*has the relation*	cause	*to*	wounds	(implicit)

Adam	*possesses*	sin	(explicit)

To fully comprehend the metaphor, the reference of the pronoun *we* has to be taken into account, as well as world knowledge about Christian theology. This leads to a set of extended propositions: [72]

Adam's sin	*is*	fall of man	(world knowledge)
We	*are of type*	human	(world knowledge)
We	*are of type*	believers	(world knowledge)

These multiple relations ("wounds are caused by Adam's sin, and bound up by God") lead to a complex metaphorical mapping which is better represented using multiple tables. Even with multiple tables, the individual tables need additional columns (in the example: C) to represent all entities that are part of the central relations. [73]

Filling in the empty cells of the tables (in angle brackets) makes visible a series of conceptual mappings that are present in the metaphor. [74]

	A	**Rel**	**B**		**C**
Target domain	Fall of man	causes	<original sin>	in	humans
Source domain	<Act of violence>	causes	wounds	in	<victims>

	A	**Rel**	**B**		**C**
Target domain	God	<redeems>	<original sin>	of	believers
Source domain	<Physician>	binds up	wounds	of	<patients>

Negation

Example (8) is taken from a non-Western region, an extract from an ancient Chinese text of Taoism. It highlights some of the challenges when annotating metaphors in different languages. [75]

(8) 吾聞言於接輿，大而無當，往而不反。 [76]
'I was listening to Chieh Yu's talk – big and nothing to back it up, going on and on without turning back.'[13]

This passage contains a negative metaphor: Chieh Yu's talk is partly characterized by what it is *not* (i.e., turning back). This leads to a proposition containing negation. Also, interpretation of the passage requires expert world knowledge with regard to [77]

13 Source: Zhuangzi, late Warring States period, around 400–200 BC (from the Chinese Text Project: https://ctext.org/zhuangzi/enjoyment-in-untroubled-ease#n2720); see Watson, Burton. 1968. *The Complete Works of Chuang Tzu*. Columbia University Press, New York, p. 4.

Chinese thought. Stating that the quality of the talk is contrasted to assumptions about natural things (see the third proposition and the table below) is an act of interpretation. However, the propositions make the basic assumptions explicit and allow other scholars to challenge the resulting analysis.

Property	言/Talk	*has property*	往/go on	(explicit)
Property	言/Talk	*has NOT property*	反/turn back	(explicit)
Property	Natural movement	*has property*	turn back	(world knowledge)

The negated property opens up two possible ways of representing this in the comparison table: If the "has not property" is mirrored on both source and target domain level, one would fill out the table as usual, i.e., asking "what else does normally not have this property?" Alternatively, one can change this to "has property" on the source level to highlight to contrastive character of the mapping. The relevant question then is "what *does* normally have this property?" As a consequence, when determining the domain mapping in step 6, the cells in the second column have to be read as "is not like." [78]

	A		**Prop**
Target domain	Talk	**is not**	<natural>
	is not *like*		*is like*
Source domain	<Natural movement>	**is**	turning back

Multiple Interpretations

It is a typical feature of metaphors that they are often deliberately ambiguous or vague and allow for different interpretations. Such ambiguities can be identified and recorded by means of parallel annotations, as illustrated by the Example in (9). [79]

(9) …et in omnibus illorum vestigia liberalibus consecutos artibus video, nec solum ea, quae emendate ab illis sunt prolata, sed etiam quosdam errores eorum amore doctorum deceptos imitari, in quibus maxime vetustissima grammatica ars arguitur peccasse. [80]
'I also see that in all the liberal arts they [= the grammarians] have followed in their [= the Greeks'] footsteps, imitating not only what was put forward without error by them, but also certain errors, seduced by reverence for these scholars. One accuses especially the earliest grammar of having sinned in this.'[14]

In this text from the fifth century, grammarians are criticized for blindly and uncritically copying from ancient Greek grammar texts. There are two MRWs that we want to look at in more detail: *deceptos* 'deceived, seduced' and *peccasse* 'sinned'. The term *grammar* [81]

14 Source: Priscianus Grammaticus Caesariensis, Institutiones Grammtaticae. Ex recensione M. Hertzii, vol. 1 (Grammatici Latini vol. II). Leipzig 1855 (Nachdruck Hildesheim 1981), Prologus ad Iulianum, p. 1.

in the second sentence is a metonymic expression and refers to the grammarians. We then arrive at the following propositions:

Rel.	Reverence for scholars	*has relation*	seduce	*to*	grammarians	(expl.)
Rel.	Grammarians	*have relation*	sin by	*to*	imitating	(expl.)
Prop.	Imitating	*has property*	uncritically			(impl.)
Met.	Grammar	*stands for*	grammarians			(impl.)

Transferring the propositions into the table results in the following open table. The term *grammarians* is both the object of the first relation and the subject of the second one. If we want to "read" the table, the second relation can be realized in the form of a relative clause: "Reverence for scholars seduces grammarians who sin by uncritical imitating." [82]

	A	**Rel**	**B**	**Rel**	**C**
Target domain	Reverence for scholars		grammarians (who)		uncritical imitating
Source domain		seduces		sin by	

Different answers are conceivable for the questions "who/what normally seduces?" and "who/what is normally seduced?" For instance, it could be temptations which seduce people or, in a biblical context, the devil who seduces Adam. Accordingly, the questions for the second relation (*sin*) are then: "By what do people/Adam usually sin?" and the answers could be: "by sin" (people) or "by disobedience" (Adam in the Garden of Eden). [83]

Instead of choosing one of the interpretations, two filled tables can be created representing the two analyses: [84]

	A	**Rel**	**B**	**Rel**	**C**
TD	Reverence for scholars	<misleads>	grammarians (who)	<are guilty by>	uncritical imitating
SD	<Temptations>	seduce	<people (who)>	sin by	<sin>

	A	**Rel**	**B**	**Rel**	**C**
TD	Reverence for scholars	<misleads>	grammarians (who)	<are guilty by>	uncritical imitating
SD	<Devil>	seduces	<Adam (who)>	sins by	<disobedience>

Ambiguities occur not only in the process of scholarly analysis, but can also be observed [85]

in the reception history of a given text. In the course of centuries, for example, biblical metaphors were interpreted differently, because of theological differences between schools, or because the historical-cultural background of the respective readers had changed. In order to trace the history of a metaphor, the annotation scheme presented can be used to either model explicit historical interpretations, e.g., from commentaries. Or the scheme can model assumed interpretations given the different background knowledge of the respective assumed (historical) reader by making explicit the assumptions ascribed to this reader.

Conclusion

The annotation scheme presented here is an implementation and extension of Steen's Five Step Method. We see many advantages of the proposed implementation in that it supports the annotators in [86]

- finding the basic formal propositions according to the given format, [87]
- formulating the propositions close to the text,
- easily recognizing and verifying the resulting mappings,
- recognizing necessary additional propositions,
- and ultimately deriving the conceptual mappings.

We argue that it is not the goal of this kind of annotation to arrive at unambiguous results most of the time. This is not to be expected because especially the propositions that are based on world knowledge will clearly differ from reader to reader (and annotator to annotator): one reader has expert knowledge about China's historical culture and will therefore interpret certain metaphors differently than a reader without this expert knowledge. More importantly, however, even two experts can differ in their scientific assumptions and hypotheses, and may therefore come to different conclusions and analyses of certain metaphors. [88]

We see the annotation scheme primarily as a tool that helps scholars to become clear about their own assumptions and (otherwise often unspoken) basic assumptions underlying their analysis, and at the same time to document these assumptions for others. It is in this sense that the resulting annotations and analyses are reproducible. [89]

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