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ARTICLE

MSDIP: A Method for Coding Source Domains in Metaphor Analysis

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ABSTRACT

This article describes the Metaphorical Source Domain Identification Procedure (MSDIP), which can be used to code source domains in metaphor identification. In the first part of the article, we describe the complexity of source-domain coding in corpus analysis. We argue that, in many cases, discourse is underspecified and multiple source-domain candidates may be relevant for a specific metaphorical expression. For instance, if a word like "fight" or "target" is used metaphorically, it could refer to either the source domain of war or sports. To make these issues explicit for analysts, we developed MSDIP, which builds on and extends the Metaphor Identification Procedure Vrije Universiteit (MIPVU). In the second part of the article, we explain the coding steps of MSDIP and subsequently report on a reliability analysis, demonstrating the reproducibility of the procedure. We end with a number of detailed sample analyses, demonstrating the role of co-text and context in selecting the likeliest source-domain candidate through MSDIP. These analyses show that MSDIP is both reliable and flexible in dealing with the complexities of real-life discourse during source-domain coding.

There is broad consensus among metaphor researchers that metaphorically used words can be seen as linguistic expressions of underlying mappings between conceptual domains (e.g., Gibbs, 2008; Semino & Demjèn, 2016). Since the introduction of Conceptual Metaphor Theory (CMT; Lakoff & Johnson, 1980) in particular, much metaphor research has studied how we conceptualize topics such as health and illness, politics, and the economy by examining if and how (clusters of) linguistic metaphors in natural discourse fit under the same conceptual umbrella (e.g., Charteris-Black, 2017; Musolff, 2020; Semino et al., 2017). For instance, metaphorical expressions such as "we are at a *crossroads*", "it's been a *bumpy road*", and "she *reached* her *destination* in life" all use language that may typically be associated with travel to describe the more abstract domain of life. As such, these linguistic metaphors are generally considered expressions of the underlying conceptual metaphor "LIFE IS A JOURNEY" (e.g., Kövecses, 2002; Lakoff & Johnson, 1980).

One of the main reasons why many researchers have focused on the identification of conceptual metaphors may be that such metaphors are considered to provide a window into human thinking and behavior (Lakoff & Johnson, 1980; Lakoff, 2016). By analyzing the ways in which people *talk* about one thing (the target) in terms of something else (the source), we may gain insight into the ways in which people *think* about one thing in terms of something else. Linking metaphorical expressions to the conceptual metaphor "LIFE IS A JOURNEY", for instance, may be taken to suggest that a person conceptualizes life in terms of progress along some kind of path (e.g., Kövecses, 2016). By contrast, when someone talks about life in terms of metaphorical fights, weapons and enemies (e.g., "the *fight* for life",

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"*arm* yourself for the future", "he is his own worst *enemy*") – suggesting the conceptual metaphor "LIFE IS WAR" – this may be taken to indicate that they conceptualize life in terms of a war. Journeys and wars are two rather different activities, and the identification of these source domains to talk about life may thus suggest different worldviews and explain different behaviors (e.g., Burgers, Konijn, & Steen, 2016; Lakoff, 2016).

Although the identification of source domains in the above examples may seem intuitively appealing, researchers have suggested that linguistic metaphors that are considered expressions of one specific conceptual metaphor could just as well be consistent with one or more other conceptual metaphors (e.g., Deignan, 2008; Eubanks, 2000; Ritchie, 2003). Ritchie (2003), for instance, argues that many linguistic metaphors that are typically considered expressions of the conceptual metaphor "ARGUMENT IS WAR", such as "strategy" and "attack", could also be identified as expressions of the conceptual metaphor "ARGUMENT IS A GAME OF CHESS". This observation suggests that specific linguistic metaphors do not *by definition* belong to (just) a single source domain, but instead can belong to more than one (related) source domain.

Recently, various methods for source-domain identification, verification, detection, and formulation have been published (e.g., Ahrens & Jiang, 2020; Coll-Florit & Climent, 2019; Deignan, 2016; Dodge, Hong, & Stickles, 2015; Krennmayr, 2013; Steen, 1999). Many such methods focus on attributing a single (or: *the*) source domain per linguistic metaphor and describe how tools such as MetaNet (Dodge, Hong, & Stickles, 2015), WordNet (Princeton University, 2010) and the Master Metaphor List (Lakoff, Espenson, & Schwartz, 1991) can be used to select a source-domain label, while other methods deploy corpus data as evidence for the formulation of possible mappings between source and target domains (e.g., Deignan, 2016). Yet other methods verify whether certain keywords belong to an a-priori hypothesized source domain (Ahrens & Jiang, 2020). Despite the increased attention for source-domain labeling, however, still relatively little attention is paid to methodological considerations that play a role in moving from the linguistic to the conceptual level of metaphor (or the other way around; Deignan, 2016, p. 103; see also Steen, 1999).

One particular methodological consideration that is typically not considered in source-domain identification studies is the potential ambiguity of source-domain options.[1] In the phrase "political *attack*", for instance, the noun "attack" is used metaphorically to describe the target domain of strong criticism. The Master Metaphor List, as well as WordNet and (online) dictionaries of English such as the *Macmillan English Dictionary* and the *Longman Dictionary of Contemporary English* describe multiple possible source-domain meanings for this noun, related to war, sports, chemical processes, and illness. Which of these source-domain meanings has priority over the others is difficult to determine. Especially when co-text (information in the text itself) or context (information outside the text) is absent or underspecified, it may often be unclear why any source domain would *by definition* have priority over others. The attribution of a single source domain to a linguistic metaphor when the co-text or context does not provide clear cues for a specific source-target domain mapping is consequently often based on analysts' intuitions or predefined conceptual metaphors. Relying on such approaches, in turn, may negatively impact the reliability and reproducibility of analyses, as the same linguistic metaphor may be analyzed in different ways by different analysts.

To resolve the issues of reliability and reproducibility, we introduce the Metaphorical Source Domain Identification Procedure (MSDIP), a systematic method for source-domain coding in metaphor analysis. Instead of identifying a single source domain for any given linguistic metaphor, we argue that source-domain analyses should allow the labeling of multiple *possible* source domains simultaneously, because, in many cases, the source domain of metaphorical words may be underspecified in discourse. While senders may play with the intended mapping of metaphorically used

[1]It should be noted that, in some cases, this ambiguity may be irrelevant to the research question at hand. This is for instance the case in Ahrens and Jiang's (2020) source-domain verification procedure. They are interested in linguistic metaphors for one specific source domain, implicitly leaving open the possibility that (some of) these linguistic metaphors may also belong to other conceptual metaphors.

words, leaving open various possible interpretations, recipients may interpret those mappings differently, depending on the salience of the source domains in their mental lexicon. By coding linguistic metaphors for multiple potential source domains, and using dictionary information instead of intuitions to do so, our method is both systematic *and* flexible at the same time, reflecting the possible strategic use and interpretation of source-target domain mappings for both senders and recipients in a transparent way.

MSDIP: A method for coding source domains in metaphor analysis

This section introduces MSDIP, a step-by-step method for coding source domains in metaphor analysis. MSDIP is an addition to the Metaphor Identification Procedure Vrije Universiteit (MIPVU; Steen, Dorst et al., 2010). MIPVU consists of a series of steps to determine whether a lexical unit[2] is used metaphorically. Specifically, the procedure requires analysts to determine whether the contextual (i.e. target domain) meaning of a lexical unit can be contrasted with, but compared to, a more basic (i.e. source domain) meaning of that unit. Basic meanings are typically "more concrete, specific, and human-oriented" (Steen, Dorst et al., 2010, p. 35). If there is contrast and comparison between the contextual and a more basic meaning, the lexical unit should be marked as metaphorical.[3]

While MIPVU enables the systematic and reliable identification of linguistic metaphors (e.g., Steen, Biernacka et al., 2010; Steen, Dorst et al., 2010), it is not concerned with the identification of specific source domains. In fact, analysts applying MIPVU should only determine whether there is *a* more basic meaning available for a lexical unit that is being analyzed, not what *the* more basic meaning of that unit is (2013Nacey, Dorst, Krennmayr, & Reijnierse, 2019, p. 48; see also Dorst, Reijnierse, & Venhuizen, 2013, p.81). The method we propose here provides a series of additional steps to make source-domain identification possible. To allow the stand-alone use of MSDIP, we have included the first four steps of MIPVU in our method. These are discussed next, followed by the additional steps that are unique to MSDIP.

In the application of MSDIP (just like in MIPVU), analyses are typically conducted on a text-by-text basis, i.e., one text at a time. To get a general impression of the contents of a text, the first step of the procedure is to read the entire text. The second step is to identify all lexical units in the text to allow the subsequent identification of metaphor on a word-by-word basis (see Nacey, Dorst, Krennmayr, & Reijnierse, 2019, for guidelines for various languages, including English, German, French and Mandarin Chinese). The third step in the procedure is to look at the first relevant lexical unit in the text. Step 4 requires the analyst to determine the contextual meaning of the lexical unit in question. This contextual meaning, describing the target-domain meaning of the word, can often, but not necessarily, be found in the dictionary.[4]

From step 5 onward, MSDIP describes the procedure to identify source domains. First, all other available meanings of the lexical unit under analysis should be examined in terms of whether or not they can be considered a possible basic meaning of that lexical unit (Step 5). Specifically, the analyst has to decide whether or not there is a metaphorical relation between the contextual meaning and each of the other meanings of the lexical unit. This decision is based on the MIPVU principle of contrast and comparison: for each available definition, it should be determined whether that definition contrasts with, but can also be compared to, the contextual meaning established in Step 4. If there is no contrast and comparison for any of the other available meanings of the lexical unit in question in the dictionary, the word is not used metaphorically, and the analyst should move to the next relevant lexical unit in the text. If, however, one or more dictionary sense descriptions display a contrast and

[2]Typically, a lexical unit is an orthographic word, but see Steen, Dorst et al. (2010) for more details on the demarcation of lexical units.
[3]Please note that, while MIPVU uses the term "metaphor-related word" to refer to both indirect and direct forms of metaphor (see Steen, Dorst et al., 2010), in this paper, we use the terms "metaphor(ical)" and "metaphorically used."
[4]Lexicalized meanings of words are found in the dictionary, while novel uses may not have been lexicalized yet, but can count as the contextual meaning of a lexical unit as well (e.g., Semino, 2008).

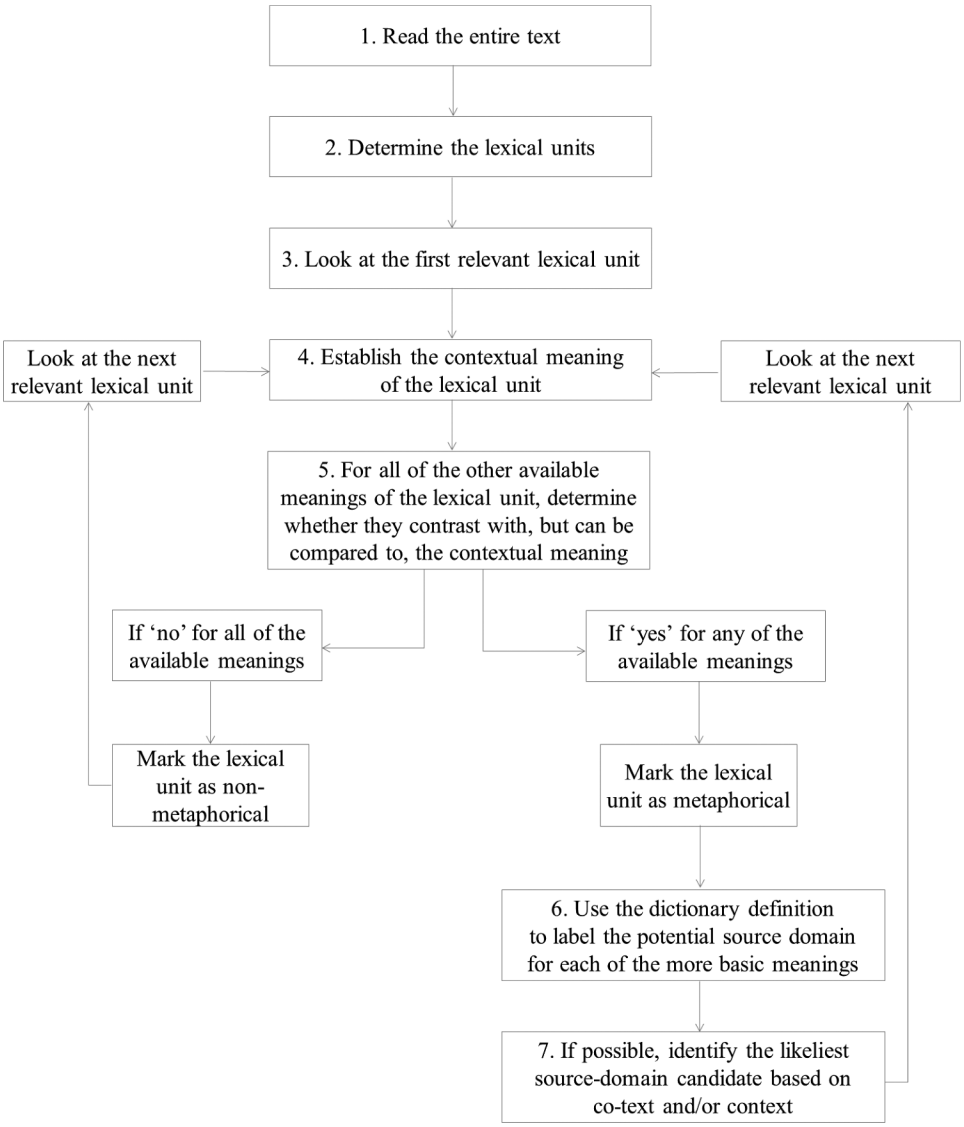

Figure 1. The coding scheme for metaphorical source domain identification.

comparison with the contextual meaning, the lexical unit must be marked as metaphorical and the basic meaning(s) is/are marked as source-domain candidate(s).

Step 6 in the procedure entails labeling the potential source domains based on the available sense descriptions in the dictionary. This is done by summarizing the domain that covers the sense description in a single word. The final step in our procedure (Step 7) is to determine whether information in the co-text or context of the metaphor suggests which of the identified basic meanings is the likeliest source-domain candidate. In this step, the analyst should justify why (i.e., on the basis of which co-textual or contextual information) one (or potentially multiple) particular source domains can be identified as the likeliest source-domain candidate(s). In case it is not possible to identify one of the candidates as the likeliest source domain, this should also be justified in this step. Figure 1 presents a schematic overview of MSDIP.

Reliability testing

To test whether MSDIP can be applied in a reliable fashion when multiple coders independently identify possible source-domain candidates (Step 6 of MSDIP), we ran a series of inter-rater reliability tests. Conducting and reporting intercoder reliability tests is an important component of developing methods for content analysis, as the aim of such methods is to allow the relatively objective coding of message characteristics (e.g., Neuendorf, 2017) – in this case specifically: the presence of possible source domains – and to yield replicable results (e.g., Krippendorff, 2018).

All reliability tests were carried out by two coders: the first author of this paper and a research assistant. The first author of this paper has over 10 years of experience with metaphor identification. At the time of coding, the research assistant was a Research Master student in linguistics who had gained some experience in metaphor identification in other projects. The data and data-analytical procedures of the reliability tests are accessible on the Open Science Framework (OSF) at https://osf.io/9vxrs/.

For the reliability analyses, we used a dataset of domain constructions. Domain constructions are adjective-noun pairs in which an attributive classifying adjective demarcates the semantic domain of a head noun (see Biber, Johansson, Leech, Conrad, & Finegan, 1999, p. 514), such as "financial *policy*" and "political *correspondent*." The dataset was compiled by selecting all adjective-noun combinations with "political" and "financial" as adjectives with at least 10 occurrences in the Corpus of Historical American English (COHA; Davies, 2010) and the Corpus of Contemporary American English (COCA; Davies, 2008–).[5] The total dataset consists of 1,029 domain constructions with "political" as the domain, and 332 cases with "financial" as the domain, yielding a total of 1,361 cases (types).

The noun in domain constructions can be metaphorical, in which case the adjective points out the target domain of the metaphor (Reijnierse, Burgers, Krennmayr, & Steen, 2018b; Sullivan, 2013). Examples of metaphorical domain constructions include "financial *bubble*," "financial *hit*," "political *dynamite*," and "political *point*." Metaphorical domain constructions are a good proxy for systematic research, because the target domain remains the same for all cases in which the adjective is the same (e.g., finance or politics), and the source domain is unspecified (due to a lack of co-text and context). The dataset was previously coded for the presence of metaphor for an unrelated project by the first author of this paper.

First, to let the research assistant practice with the identification of metaphorically used nouns using MIPVU, we sampled 150 nouns with politics as the target domain (adjective: political) from our dataset. Because our dataset consists of cases from American English discourse, the American English version of the *Macmillan dictionary* (accessible via: https://www.macmillandictionary.com/us/) was used to examine potential basic meanings. Results showed "substantial" (Landis & Koch, 1977, p. 165) agreement between the two coders ($\kappa = .711$, 86.00% agreement). Afterward a discussion was held between the two coders to further clarify MIPVU.

Next, we continued with a reliability analysis of Step 6 from MSDIP. From the larger dataset with domain constructions, we selected all 328 metaphorically used nouns with politics as the target domain (adjective: political), and all 104 metaphorically used nouns with finance as the target domain (adjective: financial). Intercoder reliability was calculated in a single round for each of the source-domain labels that were frequently identified by the coders. A number of frequently occurring source domains from the literature were predefined to speed up and streamline the coding process (e.g., to avoid issues related to the level of specificity of labels such as fight vs. war). Coders were also encouraged to add other source-domain labels when deemed relevant. Results suggest that two coders can independently code for possible source domains with the help of MSDIP in a reliable way. Table 1 displays an overview of the inter-coder reliability scores and their interpretation.

[5]The COHA contains >400 million words of written texts from different genres that were published between 1810 and 2010. See: https://www.english-corpora.org/coha/. The COCA contains >1 billion words of spoken and written texts from different genres that were published between 1990 and 2019. See: https://www.english-corpora.org/coca/.

Table 1. Overview of intercoder reliability scores for the target domains of politics and finance.

Target: POLITICS			Target: FINANCE		
Source	κ (% agreement)	Interpretation[a]	Source	κ (% agreement)	Interpretation[a]
WAR	.854 (97.26%)	Almost perfect	WAR	.823 (98.08%)	Almost perfect
MACHINE	.625 (94.51%)	Substantial	MACHINE	.768 (94.23%)	Substantial
LANDSCAPE	.711 (92.07%)	Substantial	LANDSCAPE	.654 (87.50%)	Substantial
BUILDING	.734 (96.04%)	Substantial	BUILDING	.757 (96.15%)	Substantial
ECONOMY	.797 (97.56%)	Substantial	ECONOMY	N/A[b]	N/A
LIVING BEING	.678 (86.28%)	Substantial	LIVING BEING	.711 (86.54%)	Substantial
WEATHER	.576 (96.65%)	Moderate	WEATHER	.852 (99.04%)	Almost perfect
GAME/SPORTS	.635 (93.90%)	Substantial	GAME/SPORTS	.519 (92.31%)	Moderate
JOURNEY	.528 (92.38%)	Moderate	JOURNEY	.558 (93.27%)	Moderate

[a]Interpretation based on Landis and Koch (1977, p. 165); [b] Economics cannot be a metaphorical source domain when the target domain is related to finance.

Applying MSDIP to identify the likeliest source-domain candidate: sample analyses

We next demonstrate how MSDIP works in practice by applying the procedure to a series of sample analyses. In these analyses, we pay special attention to Step 7 of the procedure, in which the likeliest source-domain candidate needs to be identified, based on cues from the co-text and/or context. The examples discussed illustrate four possible situations that analysts can come across while applying MSDIP: 1) cases for which only one source-domain candidate is available in the dictionary; 2) cases for which it is impossible to identify the likeliest source-domain candidate because neither co-text nor context provide cues; 3) cases in which the co-text displays information suggesting which of the identified source-domain candidates is the likeliest source domain; and 4) cases in which the context contains indications for the likeliest source domain. In addition, we present one sample analysis to illustrate how a clearly identifiable source-domain candidate may still yield multiple interpretations of the metaphor in question (analysis 5).

Sample analysis 1: only one possible source-domain candidate available

The first example to which we apply MSDIP is a case for which only one source-domain candidate is available. This most straightforward situation is illustrated based on an article that was published on the American political news website Politico.com. The headline of this article runs as follows:

(1) "Can Rochester's mayor survive the storm?" *(Gronewold, 2020)*

In this case, the article describes the difficult situation in which mayor Lovely Warren (Rochester, New York) found herself after firing a police chief in response to a series of incidents in which the police failed to act responsibly (Step 1). In the remainder of this analysis, we focus on the lexical unit "storm" (Steps 2, 3), which in this context (Step 4) refers to the situation in Rochester, where people were upset and asked mayor Warren to resign. This contextual meaning of "storm" is lexicalized and can therefore be found in the American English version of the online *Macmillan* dictionary: "a situation in which many people are upset or excited" (sense description 2; hereafter: MM2 for "Macmillan sense description 2," etc.).

To establish which (if any) of the other available dictionary meanings of "storm" can be identified as a possible basic meaning of the lexical unit (Step 5), we consult the other sense descriptions in the dictionary entry for "storm." A simplified version of the dictionary entry for "storm" is displayed below.

Storm (noun)

MM1. An occasion when a lot of rain falls very quickly, often with very strong winds or thunder and lightning

MM2. A situation in which many people are upset or excited

Of the two sense descriptions that are available for the noun "storm" in *Macmillan*, MM2 matches the contextual meaning, while MM1 can be considered a more basic meaning of the noun. Below, we explain why this is the case, based on the principle of contrast and comparison.

MM1. An occasion when a lot of rain falls very quickly, often with very strong winds or thunder and lightning

An occasion when a lot of rain falls, in combination with strong winds or thunder, is different from a situation in which many people are upset, but the two can be compared: just like the natural storm causes abundant rains, winds and thunder that may strongly influence a situation, so may the upset people protesting against the mayor's decision. Because MM1 is more specific than the contextual meaning MM2, it reflects a more basic meaning of "storm."

MM1. A situation in which many people are upset or excited

This is the contextual meaning of the lexical unit in example (1).

Based on the analysis above, we mark "storm" as metaphorical. The basic meaning can be labeled as "weather" (Step 6), and because no other source-domain candidates are available in the dictionary, the application of the last step of the procedure is straightforward: the only source-domain candidate is marked as the likeliest source domain (Step 7).

Sample analysis 2: no cues to identify the most likely source-domain candidate

The second example consists of a case in which co-text nor context are available to provide indications about the likeliest source-domain candidate. The example is taken from an opinion piece published in *The New York Times*, in which the author argues that Michael Bloomberg, a former mayor of New York City, correctly identified the cause of the 2008 financial crisis (Step 1):

(2) "Mr. Bloomberg blamed that year's mortgage crisis and financial crash on congressional legislation that pressured banks 'to make loans to *everyone*.'" *(Caldwell, 2020; italics in the original)*

The focus in this analysis is on the lexical unit "crash." In this context, "crash" refers to a sudden decrease in the value of the stock market. This contextual meaning is lexicalized, and can consequently be found in the dictionary: "a sudden fall in prices or in the value of the stock market" (MM4). To establish which (if any) of the other available dictionary meanings of "crash" can be identified as a possible basic meaning, we consult the other sense descriptions in the dictionary entry:

Crash (noun)

MM1. An accident that happens when a moving vehicle hits something, causing damage

MM2. An occasion when a computer or a computer program suddenly stops working

MM3. A loud noise like the sound of two hard things hitting each other and breaking

MM4. A sudden fall in prices or in the value of the stock market

a. The sudden and complete failure of a business

Of the available sense descriptions, MM4 matches the contextual meaning deployed in example (2). Below, we discuss whether each of the remaining sense descriptions can be considered a more basic meaning of the noun based on the principle of contrast and comparison (Step 5).

MM1. An accident that happens when a moving vehicle hits something, causing damage

An accident that involves a vehicle hitting something is different from a decrease in the value of the stock market, but the two can be compared: just like an accident with a vehicle is rather sudden and can cause damage, so

a sudden decrease in value can cause problems. Because sense description MM1 is more concrete than the contextual meaning, it reflects a more basic meaning of "crash."

MM2. An occasion when a computer or a computer program suddenly stops working

Computer hardware or software that suddenly stops working is different from a decrease in the value of the stock market, but the two can be compared: just like a computer (program) that all of a sudden does not work anymore may cause problems for its user, so a sudden decrease in value can cause problems. Because sense description MM2 is more concrete than the contextual meaning, it reflects a more basic meaning of "crash."

MM3. A loud noise like the sound of two hard things hitting each other and breaking

This sense description is a more general version of sense description MM1, and the same arguments apply that allow to determine that sense description MM3 reflects a more basic meaning of "crash."

MM4. A sudden fall in prices or in the value of the stock market

This is the contextual meaning of the lexical unit in example (2).

a. The sudden and complete failure of a business

This is a variant of sense description MM4. It describes the failure of a business rather than a failure of the stock market. Because this sense description and the contextual meaning of the noun belong to the same domain of economics, there is insufficient contrast between the two. Sense description MM4.a. consequently does not reflect a more basic meaning of "crash."

As the analysis above illustrates, all but one of the remaining definitions of "crash" can be identified as more basic meanings. We next label these basic meanings as potential source domains (Step 6).

1. An accident that happens when a moving vehicle hits something, causing damage → **Transportation**
2. An occasion when a computer or a computer program suddenly stops working → **Computer**
3. A loud noise like the sound of two hard things hitting each other and breaking → **Object**

In this case, the stock market referred to in example (2) above is described in terms of a vehicle (transportation), a computer, and an object. There is no cue in the immediate co-text of the noun "crash," nor in its broader context, that points toward the likeliest source-domain candidate (Step 7). In this case, the metaphor is thus ambiguous in terms of the cross-domain mapping that is being expressed. Selecting one source-domain candidate over the other possible source-domain candidates cannot be justified based on the specific use of this lexical unit in this text. Consequently, it is impossible to make strong claims about the intended source-target domain mapping by the sender, or about the interpreted mapping by the receiver. The coder should therefore indicate that multiple options are possible.

Sample analysis 3: co-text suggests the most likely source-domain candidate

The third sample analysis describes a case in which the likeliest source-domain candidate can be identified based on the immediate co-text of the lexical unit that is analyzed. The example we discuss here comes from a news article that was published on the website of Fox5 Atlanta, an American television channel. It describes support from a group of Democrats for a Republican State Representative in Georgia after the 2020 Presidential Elections (Step 1).

(3) "Georgia Democrats defend embattled Republican Secretary of State." *(Bruner, 2020)*

Here, we focus on the verb "defend." In this context, the lexical unit "defend" refers to the group of Democrats supporting their Republican colleague and how he handled the election and recount of the votes in the state of Georgia. This contextual meaning can be found in *Macmillan*: "to say things to support someone or something that is being criticized" (MM2). All other sense descriptions of

"defend" are now examined to determine which (if any) of these count as a more basic meaning of the verb (Step 5).

Defend (verb)

MM1. To protect someone or something from attack

MM2. To say things to support someone or something that is being criticized

MM3. To prevent something from failing, stopping, or being taken away

MM4. To be the lawyer in a court case who tries to prove that someone is not guilty

MM5. To attempt to win a competition that you won last time in order to keep your position as winner

MM6. To play in a team sport in a position in which you are trying to prevent the other team from getting points

Of the six main sense descriptions available, MM2 matches the contextual meaning deployed in example (3) above, as the word "defend" refers to support for the Secretary of State. Below, we discuss whether each of the remaining descriptions can be considered a more basic meaning of the verb (Step 5).

MM1. To protect someone or something from attack

Protecting someone or something from attack is different from saying things to support someone, but the two can be compared: just like protecting someone from being attacked causes support for someone in a difficult situation, so saying things in support of someone who is criticized causes support. Because sense description MM1 is more concrete than the contextual meaning, it reflects a more basic meaning of "defend."

MM2. To say things to support someone or something that is being criticized

This is the contextual meaning of the lexical unit in example (3).

MM3. To prevent something from failing, stopping, or being taken away

Preventing something such as a job or the right to free speech to be taken away is similar to saying things to support someone or something. Because sense description MM3 is similar to the contextual meaning, it does not reflect a more basic meaning of "defend."

MM4. To be the lawyer in a court case who tries to prove that someone is not guilty

Trying to prove that someone is not guilty can be considered a specification of sense description MM2: both the lawyer in a court case and the Democrats in example (3) say things in support of someone. Because this sense description and the contextual meaning of the verb are both concerned with supporting someone with words, sense description MM4 does not reflect a more basic meaning of "defend."

MM5. To attempt to win a competition that you won last time in order to keep your position as winner

Trying to keep your position as a winner is different from saying things to support someone, but the two can be compared: in both cases the person or group that does the defending tries to avoid a loss. Because sense description MM5 is more concrete than the contextual meaning, it reflects a more basic meaning of "defend."

MM6. To play in a team sport in a position in which you are trying to prevent the other team from getting points

Trying to prevent another team from scoring points is different from saying things to support someone, but the two can be compared: in both cases the person that does the defending tries to protect something. Because sense description MM6 is more concrete than the contextual meaning, it reflects a more basic meaning of "defend."

Out of the six sense descriptions of "defend" that are available in the dictionary, three can thus be identified as more basic meanings. We now label these basic meanings as potential source domains (Step 6):

1. To protect someone or something from attack → **Violence**
5. To attempt to win a competition that you won last time in order to keep your position as winner → **Competition**
6. To play in a team sport in a position in which you are trying to prevent the other team from getting points → **Sport**

Based on the analysis of more basic meanings of the verb "defend," the Democratic support for the Georgian Secretary of State referred to in example (3) is thus described in terms of violence, a competition, and sports. To determine if one of these more basic meanings is a likelier source-domain candidate than the others, we examine whether there are cues in the co-text and/or context of "defend" that point to either of the source-domain labels established for "defend" (Step 7). In this case, there is another metaphorically used word in the immediate co-text of "defend" that expresses another aspect of the situation by means of a similar source-target domain mapping between a person that experiences a lot of problems and physical violence, namely "embattled." In this case, "embattled" therefore serves as a cue allowing the analyst to identify "attack" as the likeliest source-domain candidate in this example.

Sample analysis 4: the context contains indications for the intended source domain

We now demonstrate a case of how the likeliest source-domain candidate can be identified based on information from the context of the lexical unit. Example (4) is taken from the book *Wells Fargo: Advancing the American Frontier*, written by Edward Hungerford (1949). The book is about Wells Fargo, an American financial services company that was established during the California Gold Rush. The extract below describes the life of Edward Harriman, one of the central figures in this company.

(4) "At an early age he was able to buy a seat on the New York Stock Exchange and immediately immersed himself in the financial network of American railroads." *(Hungerford, 1949; via COHA)*

In (4), the noun "network" is used to describe a group of people or organizations that collaborate. Just as was the case for the other examples discussed in this paper, the contextual meaning of "network" is available in *Macmillan*: "a group of people, organizations, or places that are connected or that work together" (MM2). We now examine the other meanings of the noun.

Network (noun)

MM1. A group of companies that broadcast the same television or radio programs throughout a large area, or a company that produces or sells the rights to such broadcasts

MM2. A group of people, organizations, or places that are connected or that work together

MM3. A set of computers that are connected to each other so that each computer can send and receive information to and from the other computers

MM4. A system of lines or similar things such as roads or wires that are connected to each other

The next step is to examine whether each of the descriptions can be considered a more basic meaning of the noun based on the principle of contrast and comparison.

MM1. A group of companies that broadcast the same television or radio programs throughout a large area, or a company that produces or sells the rights to such broadcasts

Railway companies and broadcasting companies differ in terms of what they create or sell, but the idea of collaboration is the same. Because there is no contrast between this sense description and the contextual meaning of "network," this description does not reflect a more basic meaning of it.

MM2. A group of people, organizations, or places that are connected or that work together

This is the contextual meaning of the lexical unit in example (4).

MM3. A set of computers that are connected to each other so that each computer can send and receive information to and from the other computers

Connected computers are different from collaborating companies (contrast), but the two can be compared: just like the connection between machines allows smooth exchange of information, so the relation between companies can allow smooth business. Because sense description 3 is more specific than the contextual meaning, it reflects a more basic meaning of "network."

MM4. A system of lines or similar things such as roads or wires that are connected to each other

Connected roads or wires are different from companies (contrast), but the two can be compared: just like roads or wires can form a system, so companies can form a system. Because sense description 4 is more concrete than the contextual meaning, it reflects a more basic meaning of "network."

The two definitions of "network" that can be identified as more basic meanings can be labeled as follows:

3. A set of computers that are connected to each other so that each computer can send and receive information to and from the other computers → **Computer**
4. A system of lines or similar things such as roads or wires that are connected to each other → **Connected lines or similar things**

Based on the analysis above, the mapping between source and target domain expressed by "network" in example (4) above can either be between computers and companies, or between connected lines and companies. In this example, there is no information available in the immediate co-text of the noun that provides cues to determine which of the two source-domain candidates is the likeliest. Therefore, we consider the context in more detail – more specifically, the historical context. One aspect of the historical context of this example that is particularly relevant, is the fact that it comes from a book that was published in 1949. If we want to analyze the example in its historical context, the computer-related meaning of "network" must be ruled out as a source-domain candidate because it only occurred for the first time in 1962, according to the *Oxford English Dictionary* (Oxford English Dictionary Online, n. d.). MM4, which refers to concrete connections of lines or similar things, consequently remains as the likeliest source-domain candidate.[6]

Sample analysis 5: multiple possible interpretations of a single source-target-domain mapping

In this final sample analysis, we show how a rather straightforward identification of a likeliest source domain may still lead to multiple possible interpretations. As such, this sample analysis shows when the limits of the identification procedure are reached, and opens up a range of new research questions for future research.

The example we discuss below comes from an article that was published in the international edition of *The Guardian*. After UK Prime Minister Boris Johnson compared himself to the Hulk, journalist Stuart Heritage wondered:

(5) "'If Boris is the Hulk, which Hulk is he?'" *(Heritage, 2019)*

In this case, the target domain is Boris Johnson, or – more generally – Britain in times of Brexit negotiations. The contextual meaning of "the Hulk" cannot be found in *Macmillan*, and neither can potential basic meanings because the dictionary does not contain an entry for this proper noun.[7]

[6]"Network" can also be considered a case of topic-triggered metaphor (Koller, 2004; Semino, 2008) because MM4 refers to connected (rail)roads, and the text is about American railroads. This "topic-triggeredness" could constitute a second cue pointing out the likeliest source-domain candidate, but, in this example, context is the decisive factor for identifying MM4 as the likeliest source domain.

[7]Please note that the *Macmillan dictionary* does contain an entry for the regular noun "hulk" (MM1: the shape of something such as a large ship or building, especially after the inside of it has been destroyed by fire; MM2: someone who is very tall and heavy). However, because reference is clearly made, in example (5), to the proper noun, and thus the comic/film character, the dictionary entry for the regular noun does not provide relevant information for our analysis.

Instead, in cases like these, when reference is made to popular culture, sometimes analysts may need to resort to other sources to properly examine the possible more basic meanings of a word. In this case, more information is available on the website of Marvel Entertainment, on which the Hulk is described as a "mild-mannered scientist [who] transforms into a powerful being called the Hulk whenever he gets angry" (Marvel Entertainment, n.d.). The Hulk thus is a strong superhero known from comic books and movies. Based on this description, it is clear that the politician Boris Johnson is described in terms of a superhero (the Hulk).

Although the comparison between politicians and superheroes thus may seem rather specific, Heritage (2019) shows how the interpretation of this mapping may differ depending on which appearance of the Hulk the sender is referring to, or which appearance of the Hulk the recipient has in mind. Specifically, by describing a number of different versions of the Hulk in different movies, the journalist explains how we may understand Boris Johnson describing himself as the Hulk differently as well. In a film like *Hulk* (2003), for instance, the Hulk suffers from family issues, in *Avengers: Endgame* (2019) he is presented as angry and smart at the same time, and in *Thor: Ragnarok* (2017) the Hulk is in control of an entire planet (Heritage, 2019). Thus, the choice for a specific source domain may result in a number of different more positive or more negative interpretations of the target domain. This illustrates that *just* identifying a metaphor's source domain may not be sufficient to fully understand the use of metaphor in discourse.

Conclusion and discussion

In this paper, we introduced MSDIP, a reliable method for the identification of metaphorical source domains in discourse. The development of the method was inspired by the observation that many studies focusing on source-domain identification, detection, and formulation are aimed at identifying *a single* source domain, while it has been suggested that many metaphorically used words may in fact be compatible with multiple source-target domain mappings (e.g., Ritchie, 2003). While the potential ambiguity of source-domain options has thus been acknowledged in the literature, the method introduced in this paper is the first to focus on the identification of multiple source-domain candidates in a systematic, step-by-step manner.

Specifically, MSDIP requires analysts to examine and identify all possible source-domain candidates for a metaphorically used word, and justify whether and why one of these can be considered the likeliest source-domain candidate. In a series of sample analyses, we have shown the application of the procedure in practice, thereby illustrating a range of situations in which identification of the likeliest source domain is either relatively straightforward or more complicated. We have argued that none of the possible source-domain meanings of a metaphor *by definition* have priority over others. Consequently, in the absence of cues from the co-text or context of a metaphorically used word suggesting the intended source domain, researchers need to acknowledge that multiple possible candidates are available in order to produce reliable and replicable analyses.

MSDIP explicitly allows the identification of multiple source-domain candidates, and asks analysts to examine whether cues in the co-text and/or context of a metaphor justify the identification of the likeliest source-domain candidate. As such, MSDIP is systematic and flexible at the same time: it avoids predefined mappings and personal intuitions from interfering with the analysis and enables researchers to examine the full potential of the strategic use and interpretation of metaphors.

As a further indication of the viability of our procedure and of its relevance to metaphor research, we conducted a small-scale analysis. For the 432 metaphorical domain constructions that we used in the reliability tests reported elsewhere in this paper, we calculated for how many nouns one versus multiple source-domain candidates were identified. Results showed that, for 78.24% (338 cases) of the metaphorically used nouns in our dataset, two or more source-domain candidates could be identified (see https://osf.io/9vxrs/ for data, code and output). If this percentage provides an accurate estimate for metaphorical words across all word classes, this suggests that multiple source-domain candidates are available for the large majority of metaphorical words. It also suggests that, for most metaphors,

analysts would need to carefully consult the co-text and/or context to potentially be able to determine the likeliest source-domain candidate. It should be noted, however, that we only report the results of a small-scale study here, and that these findings need to be replicated in a larger corpus in future research. If such replication can be achieved, this might further explain why source-domain identification has been notoriously difficult in metaphor studies.

It is important to note that MSDIP does not identify conceptual metaphors. The method is concerned with the linguistic level of metaphor identification, and identifies source-domain *candidates* on the basis of a thorough analysis of basic meanings of metaphorically used lexical units. In this way, MSDIP is similar to other metaphor identification methods such as MIPVU (Steen, Dorst et al., 2010), which are also concerned with linguistic metaphor identification. The method presented in this paper may provide a starting point for further research going from the linguistic to the conceptual level of metaphor analysis. One aspect that deserves further exploration in this respect is the level of specificity of source-domain labels (see also Deignan, 2016). Step 6 of the method requires analysts to label source-domain candidates by summarizing the dictionary sense description, thus allowing for a large number of labels. Researchers may want to decide about a level of specificity at which to formulate conceptual metaphors to avoid a proliferation of very similar, but slightly differently formulated, conceptual metaphors and foster replicable, reliable analyses.

It is also important to notice that, although MSDIP makes the ambiguity of source-domain choice visible by explicitly requiring analysts to consider all possible source-domain candidates of a metaphorically used word, the method presented in this paper does not provide insight into senders' considerations for choosing and using a certain metaphor, nor into receivers' interpretations of those metaphors. In this sense, the method is similar to other identification methods for metaphor such as MIP (Pragglejaz Group, 2007), MIPVU (Steen, Dorst et al., 2010) and DMIP (Reijnierse, Burgers, Krennmayr, & Steen, 2018a) and identification procedures for other forms of figurative language like HIP for hyperbole (Burgers, Brugman, Renardel de Lavalette, & Steen, 2016) and VIP for irony (Burgers, van Mulken, & Schellens, 2011). Results from the application of MSDIP to discourse may, therefore, be used as a starting point for future quantitative and qualitative research aiming to further uncover the distribution and characteristics of source-domain candidates, as well as the underlying motivations for metaphor use by senders and their interpretation by recipients. Such research could for instance take the form of a content analysis that examines how often co-text and/or context allow to justify the identification of a likeliest source domain.

Future research could also examine whether cases with single vs. multiple source-domain candidates are experienced differently by language users. Such studies could ask whether metaphors with multiple source-domain options are considered to have a richer or more poetic nature, and are processed differently compared to metaphors with one source-domain option. Furthermore, interviews or think-aloud protocols could be used to investigate whether speakers use strategic considerations when selecting metaphors for which multiple source-domain candidates are available (and if so, which ones).

Finally, previous research has demonstrated the complexity of determining which linguistic expressions are part of which conceptual metaphor (e.g., Deignan, 2008; Eubanks, 2000; Ritchie, 2003). MSDIP provides concrete guidelines for source-domain classification. An important follow-up question would be to explore whether readers unfamiliar with metaphor theory would make similar or different judgments as MSDIP. Future research could thus contrast source-domain codes provided by applying MSDIP with those provided by "regular" readers, e.g., through crowd coding (Adams, 2015). Such a project could reveal when and how linguistic analysis and text processing converge or diverge when encountering metaphors in text.

In conclusion, by introducing MSDIP, a method for coding source domains in metaphor analysis, this paper contributes to the growing literature on metaphor identification. MSDIP is a systematic procedure that can be used together with MIP (Pragglejaz Group, 2007) and MIPVU (Steen, Dorst et al., 2010). MSDIP comprises the identification of *potential* source-domain candidates through a number of systematic steps. On the one hand, MSDIP can be used in a reliable way to identify potential source-domain candidates of metaphor in a larger corpus. On the other hand, MSDIP also leaves room for potential ambiguity in texts, acknowledging that, in some cases, multiple source-

domain candidates may be applicable to a specific metaphorically used word and specifying conditions under which one source-domain candidate may be likelier than another. By introducing MSDIP, we broaden the debate about the potential ambiguity of source-domain options in metaphor identification from a largely theory-driven discussion (e.g., Eubanks, 2000; Ritchie, 2003) into an empirical question.

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Data availability statement

The data and data-analytical procedures of the reliability tests and the small-scale analysis reported in this paper are publicly accessible on the Open Science Framework (OSF) at https://osf.io/9vxrs/.

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