Research Article

An account of inter-lexical polysemy in Italian prepositions: The case of *per*, *tra*, *attraverso*

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Abstract: The goal of this paper is to offer an account of an inter-lexical polysemy pattern connecting the three Italian prepositions *per*, *tra* and *attraverso*. It is shown via a corpus study that these prepositions can cover several related senses (i.e. they are polysemous), and that some of their senses overlap (i.e. inter-lexical polysemy is attested), thereby forming a clear-cut (lexical) contrast set. It is suggested that current theoretical proposals of polysemy cannot directly account for these data, and thus a new model must be introduced. The paper introduces such a model by combining generative (cartographic) syntactic insights with a Semantic Maps analysis. It is thus suggested that inter-lexical polysemy patterns arise because prepositions share syntactically equivalent structures, but partially different sense values are assigned to these structures. Therefore, these prepositions partition the semantic sub-space of 'section' spatial relations in only partially overlapping manners. Consequences for theories of polysemy and their connections to syntactic accounts of prepositions are discussed.

Keywords: polysemy, Italian prepositions, cartography, semantic maps, metaphor identification procedure

1 Introduction

Polysemy is traditionally defined as the ability of a vocabulary item to carry distinct but related senses (e.g. Apresjan, 1974; Riemer, 2005, Chapter 1; Ruhl, 1989). Different frameworks have proposed the existence of different sub-types of polysemy. However, assumptions and defining properties regarding these sub-types tend to vary considerably across frameworks. Lexical semantics and formally oriented works focus on three well-established types (e.g. Murphy, 2010; Asher, 2011); cognitively oriented works have introduced two novel and more controversial types (e.g. Evans, 2019). Furthermore, the empirical evidence that can confirm the existence of these types is often subject to intense debate (Dölling, 2020; Ursini & Giannella, 2016; Ursini & Long, 2021; Vicente & Falkum, 2017). For these reasons, we present an overview of this debate to guide readers not acquainted with polysemy through current proposals, and direct our focus onto one novel and understudied sub-type.

Lexical semantics works on polysemy suggest that polysemy includes two types: *regular* and *novel* polysemy. Regular polysemy holds when vocabulary items cover multiple, related senses (e.g. English *on* covering 'support', 'attachment' senses: Kearns, 2006; Murphy, 2010). *Novel* (or *irregular*) polysemy holds when new senses emerge over time, possibly via forms of metaphor and/or metonymy (e.g. an 'excellent' sense for the adjective *wicked*, see Evans, 2015).

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Formal works introduce a third type, *logical* polysemy, that holds when a vocabulary item can cover mutually exclusive sense types (e.g. *book* covering 'object' and 'informational entity' senses, see Asher, 2011; Pustejovsky, 1995). The *Lexical Cognitive Concepts Model* (henceforth LCCM, see Evans, 2009; 2010; 2015; 2019) framework has recently introduced the novel *conceptual* and *inter-lexical* polysemy sub-types. Conceptual polysemy holds when items can cover non-prototypical senses in context (e.g. *at* covering a functional sense in *at the piano*). Inter-lexical polysemy holds when different vocabulary items can share at least one sense (e.g. 'inclusion' for *standing in a line* vs *standing on a line*).

Conceptual polysemy seems indistinguishable from novel polysemy and thus is considered highly controversial (e.g. Falkum, 2015; Vicente & Falkum, 2017). On the other hand, the evidence that the LCCM framework offers for the inter-lexical polysemy sub-type is consistent with classical views on sense relations. The reason can be summarised as follows. Standard lexical semantics observe that words forming semantic fields can do so because they enter "sense overlap" relations (e.g. Cruse, 1986; Jezek, 2016; Murphy, 2010; Nida, 1975). Sense overlap holds when words share part of their senses and definitions. For instance, *dog* and *mutt* overlap in their senses because both nouns can refer to dogs, but *mutt* also carries negative connotations attributed to its potential referents. Frameworks such as the Frame Semantics (e.g. Fillmore, 1982; 2006; Fillmore & Baker, 2012) model sense overlap by assuming that words can share some but not all senses in their sense ranges. Hence, inter-lexical polysemy can be conceived as a sense overlap relation holding when two words are polysemous, and share at least one sense. It should thus be attested in words and categories displaying rich polysemy patterns.

Evidence for these four polysemy sub-types is often documented in studies focussing on English prepositions (e.g. Tyler & Evans, 2003). Most English prepositions carry multiple *spatial* senses (e.g. 'support' and 'attachment' for *on*). They can also cover *temporal* sense types (e.g. *at* in *at 5 p.m.*, see Haspelmath, 1997), and *state* sense types by describing "states" ascribed to entities (*at* in *Mario is at peace*, see Evans, 2010). Some works also propose a fourth *fictive motion* type (e.g. *the cloud floats in the air*, see Walínski, 2018). This type is minimally distinguished from the spatial type because it involves inanimate, non-agentive entities that cannot move of their own volition. Their motion is thus not conceived as literal but as "fictional". These four sense types seem to exist in other languages and their adpositional systems, thus confirming the rich polysemy of adpositions (cf. Hagège, 2010). For instance, multiple spatial senses for a preposition confirm its regular polysemy; multiple sense types, logical polysemy; putative novel senses, novel/irregular polysemy. Inter-lexical polysemy, however, still seems understudied, perhaps due to its very recent individuation as a distinct phenomenon.

To ameliorate this situation, we will discuss a set of data involving Italian prepositions. We chose this language because polysemy forms in Italian prepositions still seem poorly documented (cf. Bjelobaba, 2018; Ursini, 2017; Ursini et al., 2022). Therefore, our paper aims to fill in an empirical void in the description of Italian prepositions. For this purpose, we have selected a triplet that seems to display an unanalysed instance of inter-lexical polysemy: *per*, *tra/fra* and *attraverso*. We have limited our choice to this triplet for two reasons. First, though some evidence exists that these prepositions share some senses (e.g. Hoelbeek, 2017), a full-fledged analysis of the data is still missing. Second, by restricting our attention to a well-defined

sub-set of semantically related prepositions, we can delineate our novel account in a clear-cut manner.[1] Consider thus the sentences in (1)–(4):[2]

(1)　a.　*I　ragazzi　camminano　　　per le　montagne.*
　　　　　The boys　　walk　　　　　PER the　mountains
　　　　　'The boys walk across the mountains.'

　　　b.　*I　ragazzi　camminano　tra le　montagne.*
　　　　　The boys　　walk　　　　TRA the　mountains
　　　　　'The boys walk across the mountains.'

　　　c.　*I　ragazzi　camminano　attraverso　　le　montagne.*
　　　　　The boys　　walk　　　　ATT　　　　　the　mountains
　　　　　'The boys walk across the mountains.'

(2)　a.　*I　ragazzi　si　　　　preparano　　per Natale.*
　　　　　The boys　　REFL　　　prepare　　　PER Christmas
　　　　　'The boys get ready for Christmas.'

　　　b.　*I　ragazzi　si　　　　preparano　　#tra Natale.*
　　　　　The boys　　REFL　　　prepare　　　TRA Christmas
　　　　　'The boys get ready for Christmas.'

　　　c.　*I　ragazzi　si　　　　preparano　　#attraverso　Natale.*
　　　　　The boys　　REFL　　　prepare　　　ATT　　　　　Christmas
　　　　　'The boys get ready for Christmas.'

(3)　a.　*Luigi　è　　rimasto　a　　casa　　per aiutare　suo　fratello.*
　　　　　Luigi　is　remained at　home　　PER help　　　his　brother
　　　　　'Luigi remained home to help his brother.'

　　　b.　*Luigi　è　　rimasto　a　　casa　　#tra　　aiutare　suo　fratello.*
　　　　　Luigi　is　remained at　home　　TRA　　help　　his　brother
　　　　　'Luigi remained home to help his brother.'

　　　c.　*Luigi　è　　rimasto　　a　　casa　　#attraverso　aiutare　suo　fratello.*
　　　　　Luigi　is　remained　　at　home　　ATT　　　　　help　　his　brother
　　　　　'Luigi remained home to help his brother.'

(4)　a.　*Le　nuvole　passano per le　montagne.*
　　　　　The clouds　　pass　　　PER the　mountains
　　　　　'The clouds pass across the mountains.'

　　　b.　*Le　nuvole　passano tra　　le　montagne.*
　　　　　The clouds　　pass　　　TRA　　the　mountains
　　　　　'The clouds pass across the mountains.'

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1 A third reason is practical. As Tyler and Evans (2003) show, the analysis of more than one set of prepositions (42, in their work) requires monograph-length treatments of the data. We must also therefore restrict our focus on this small contrast set for length requirements.

2 We follow Leipzig Glossing rules (Croft, 2003, p. xiv–xxv), though we gloss prepositions via small capital letters to represent the possible senses that they can cover.

    c.   *Le nuvole passano attraverso le montagne.*
        The clouds pass   ATT   the mountains
        'The clouds pass across the mountains.'

Via (1a–c), we show that *per*, *tra* and *attraverso* share one spatial sense. Each preposition can equally occur in a sentence describing some boys walking 'across' some mountains, rendering these sentences near-synonymous. However, only *per* in (2a) can combine with the Noun Phrase (henceforth NP) *Natale* to describe the festivity (i.e. temporal interval) for which the boys are getting ready. The presence of the other two prepositions would render the sentence uninterpretable (i.e. senseless), viz. the symbol "#" in (2b–c). The same pattern holds in (3a–c), although the Verb Phrase[3] (henceforth: VP) *aiutare suo fratello* introduces the reason for which Luigi remained at home. Only *per* can take this VP as a complement introducing a "state of affairs"; *tra* and *attraverso* cannot do so. Via (4a–c), we show that all three prepositions are acceptable when the moving entity is non-agentive (i.e. some clouds), and thus a sentence carries a fictive motion sense.

Overall, *per*, *tra* and *attraverso* may share at least one spatial, 'across' sense (cf. (1)), and one fictive motion sense (cf. (4)). The temporal sense introduced in (2a), and the state sense introduced in (3a) seem exclusive to *per*. Therefore, this triplet is involved in a form of inter-lexical polysemy; the question, then, is how an LCCM account would capture these data. LCCM models polysemy via *radial sense networks*, a tool inherited from Conceptual Metaphor Theory (e.g. Lakoff, 1987; 1993; Lakoff & Johnson, 1980; 1999; Langacker, 1987; 1991; 2008). Sense networks have spatial senses at their centre (e.g. 'inclusion' for English *in*). Other sense and sense types propagate from the centre, connected via sense similarity relations (e.g. 'temporal inclusion' for English *in*) and representing a word's polysemy in detail.

Contrast sets can then be defined as sets of words whose senses partition a semantic domain (e.g. 'vertical position') into more specific senses. For instance, the preposition *up* can be associated with a '(positive) vertical, supporting position' sense; *above*, with '(positive) vertical, proximal position' sense; *over*, with a 'vertical, distal position' (cf. Tyler & Evans, 2003, p. 27–42). Inter-lexical polysemy hence holds when words as members of a contrast set from the same category share one or more non-primary senses. Our triplet of prepositions, however, offers evidence countering the analysis proposed in LCCM: they seem to share their primary (i.e. spatial) 'across' sense. They thus provide evidence supporting the existence of inter-lexical polysemy, but not as proposed in LCCM.

The goal of this paper is to offer an alternative account regarding how *per*, *tra* and *attraverso* can form a contrast set and enter inter-lexical polysemy relations, as (1)–(4) suggest. Consequently, the paper also aims to further establish inter-lexical polysemy as a fourth distinct type of polysemy. We show that vocabulary items belonging to the same category (here, prepositions) and contrast set can "share" some senses. We base this account on the Semantic Maps model (Haspelmath, 2003), enriched with some aspects borrowed from generative (cartographic) accounts of prepositions' structure (Franco, 2016). Anticipating matters a bit, we suggest that inter-lexical polysemy emerges when different prepositions involve near-equivalent morpho-syntactic structures that are associated with alternating semantic values (cf. Romeu, 2014). We show that, under this view, any sense and sense type can be shared, *contra* LCCM assumptions and in line with the data in (1)–(4). The paper is organised as follows: § 2

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3 We use more theory-neutral labels for categories and phrases in § 1–4, since we have not yet introduced our theoretical analysis. In § 5, we introduce our theoretical analysis and, with it, data-specific labels.

presents previous literature; § 3–4 the methodology to extract and analyse corpora data, and the results; § 5 proposes the analysis; § 6 offers a discussion and conclusions.

2   Previous literature: Semantic polysemy in Italian prepositions

In this section we give an overview of previous works on our topic. Before we do so, however, we will introduce some basic grammatical notions about Italian prepositions. Our purpose for this perhaps elementary primer is twofold. First, this paves the way for the integrated analysis we will propose in § 5. Second, this introduces notions that permit us to offer a coherent, streamlined analysis of *per*, *tra* and *attraverso* in their distribution/collocation in the data.

Reference grammars suggest that Italian has 9 simple prepositions, i.e. *di*, *a*, *da*, *in*, *per*, *con*, *su*, *tra* and *fra*, with the doublet *tra* and *fra* acting as allomorphs (Rizzi, 1988; Salvi & Vannelli, 2004). Morphologically complex prepositions include *di fronte a* 'in front of', and *nei pressi di* 'in the surroundings of', among others (Folli, 2002; 2008). *Attraverso* is considered a complex preposition because it can include an optional *a* when introducing certain sub-types of ground NPs, i.e. *attraverso (a)lla galleria* 'through the gallery' (Rizzi, 1988, p. 510; Tortora, 2005; 2008).[4] Simple and complex prepositions mostly share syntactic distribution as heads mediating between verbs and complement NPs, forming Prepositional Phrases (henceforth PPs, Franco, 2016; Ganfi & Piunno, 2017; Piunno & Ganfi, 2019; 2020; Ursini, 2015). Thus, most works differentiate between simple and complex Italian prepositions to highlight their different morphological structure, but acknowledge that their syntactic distribution tends to be homogeneous.

The recent Franco (2020) has, however, shown that *per*, *tra*, *con* and *su* can combine with *di* when taking indexicals and pronouns as their argument NPs. For instance, one can have *le macchine passano per di qui* 'the cars pass through here' as a case of *per* taking *di* as a "liaison" preposition, thus forming the complex *per (di)* preposition. Hence, this work suggests that simple prepositions may be reduced to a quartet of elements (i.e. *a*, *da*, *di*, *in*), combining with other items to form complex prepositions (e.g. *di fronte a* 'in front of'). It also suggests that all the other prepositions can be considered complex, and project identical structures but with different exponents and corresponding senses. These and other morpho-syntactic works offer strong evidence that simple and complex prepositions can be analysed as variants of one template, the evidence of which we will fully discuss in § 5. However, they do not generally explore semantic matters. Therefore, we need to first examine those works that discuss such matters.

Polysemy as a general semantic phenomenon in Italian has been seldom explored. One early exception is Taylor (1988), which operates within Conceptual Metaphor Theory. The work discusses the polysemy of *su*, *sopra a* and the construction *al di sopra*. It observes that these prepositions can each cover a 'vertical position, no contact' sense, though other senses are distinct. The work proposes sense networks for each preposition, and suggests that the shared sense involves a '+vertical, -contact' compound sense. That is, two semantic features (i.e. '+vertical', '-contact') combine to form a distinct sense. This work does not employ the term

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4 Generative analyses assume that NPs are complements of determiner heads. Determiners take NPs as complements to form Determiner Phrases (henceforth: DPs). In Italian, however, determiners may often undergo conflation with prepositions to form *preposizioni articolate* 'inflected prepositions'. Furthermore, bare NPs can often occur when prepositions have non-spatial senses (e.g. *essere in pace* 'to be at peace'). For these reasons, we have opted to use the "NP" label in § 1–4. We, however, will adopt the "DP" label in § 5, once we present our analysis. See also Franco, Manzini and Savoia (2021), Ursini (2015) for discussion.

"inter-lexical polysemy". However, it acknowledges that these prepositions share some of their spatial senses, by sharing some of the semantic features constituting these senses (e.g. i.e. the '+vertical' feature). Other sense types for these prepositions (i.e. temporal senses), however, are not analysed in detail.

Brala (2000) compares Italian *a*, *su* and *in* to their (apparent) English counterparts *at*, *on* and *in*. This work offers a feature-based analysis similar to Taylor's (1988), but uses it to compare semantic differences in the sense networks associated with these prepositions. The work suggests that Italian differs from English in having different combinations of semantic features to form each preposition's senses within a sense network. While Italian *a* is minimally polysemous in that it does not distinguish the 'location'/'direction' sense alternation, English *at* lacks this ambiguity. Other spatial senses for these prepositions are discussed in detail, but non-spatial sense types are left aside.

Two other works operating within a cognitive linguistics framework are Luraghi (2009; 2011). These works investigate the polysemy of *da* and *di*, both prepositions originating from the Latin *de* and its distribution with the ablative case (cf. also Giuliani, 2013). The works propose sense networks in which spatial senses are primary senses ('motion from source' for *da*, 'general location' for *di*). From these spatial primary senses, temporal and state ("metaphoric", in these works) have emerged over the diachronic evolution of the two prepositions in modern Italian. Both works argue that non-primary senses preserve the core meanings (senses) of these prepositions, though they transpose them to other semantic domains. For instance, *da* can introduce the temporal moment from which a certain event starts (e.g. *sono sveglio da-lle cinque* 'I am awake since 5 a.m.'). Unlike the other discussed works, Luraghi (2009; 2011) does not attempt an analysis along semantic features, for the primary sense and other senses alike.

The recent Bjelobaba (2018) uses the *Principled Polysemy Network* model of Tyler and Evans (2003) to offer sense networks of a sub-set of prepositions (e.g. *in*, *da*, *di*, *a*, *su*, *sopra*, *di fronte a*). It suggests that prepositions covering 'axial' senses share their spatial senses in virtue of carrying a more restricted semantic value (e.g. *su* 'up', *sopra* 'above'; *di fronte a* 'in front of', *davanti a* 'ahead of'). The work then proposes that Italian prepositions can be organised along contrast sets that involve relations of near-synonymy (e.g. *su* and *sopra*) or hyponymy. For instance, *davanti a* is analysed as a hyponym of *di fronte a*, since the former refers to frontal *and* proximal locations. This work, however, restricts its attention to the spatial senses of the selected vocabulary items, and, crucially, does not investigate our target triple of prepositions.

On the other hand, Hoelbeek (2015; 2017) sheds light on the spatial and fictive motion senses of the French preposition *à travers de*. Similarly to previous works on this preposition (e.g. Stosic, 2007), it suggests that a 'cross-section' sense acts as the primary or "core" sense of this preposition. Crucially, Hoelbeek (2015; 2017) proposes that the Italian *attraverso* carries symmetrical senses to this French preposition. However, both works also do not investigate other senses of the Italian preposition, let alone *per* and *tra*. Two more works can be found in Ursini (2017; 2020). The first work offers a formal treatment of polysemy and sense selection in simple and (some) spatial prepositions (e.g. *a*, *in*, *di fronte a*). It proposes that sense selection occurs via the contribution of prepositions' complement NPs. The second work proposes a Semantic Maps model of this cluster, in which prepositions are associated with the spatial regions that they can denote in context (e.g. frontal locations for *di fronte a*). Neither work investigates non-spatial senses, nor touches our triplet of prepositions.

Crucially, the possibility that Italian prepositions involve inter-lexical polysemy patterns is adumbrated but not fully addressed. For instance, Taylor (1988) suggests that sense networks can be connected via shared features (i.e. the "meaning chain" proposal). Thus, networks can share senses as clusters of equivalent features. Luraghi (2009; 2011) observes that the common origins of *da* and *di* are reflected in their 'motion from source' sense. They, however, do not connect this form of sense overlap to a broader theory of inter-lexical polysemy. Bjelobaba (2018) explicitly connects "axial" prepositions and their polysemy forms via hyponymy relations. Though they do not use the term "inter-lexical", these works seem to indirectly acknowledge this polysemy form. However, they do not discuss the possible overlapping syntactic distribution (or lack thereof, cf. (1)–(4)) of such prepositions, due to their focus on semantic matters. Overall, we can conclude that a solution to our original problem is still missing. We do not know how the triplet of Italian prepositions *per*, *tra* and *attraverso* can share some senses (i.e. attest inter-lexical polysemy) in virtue of forming a (semantic) contrast set. To this solution, we now turn.

3   Methodology

Our goal was to identify the range of senses that each of our three prepositions can cover in sentences. We collected data by using a form of *triangulation* (Damico & Tetnowski, 2014; Rothbauer, 2008). Triangulation is a methodological procedure that involves the use of multiple methods to collect and analyse a given data set. The goal is to prove that the interpretation of the results does not depend on the methodological choices or theoretical framework(s) on which the analyses are based. Rather, this interpretation explicates the intrinsic properties of the data set, and can support the different but converging analyses in an equal manner. We illustrate how triangulation works in Fig. 1:

Figure 1

A visual representation of Triangulation.
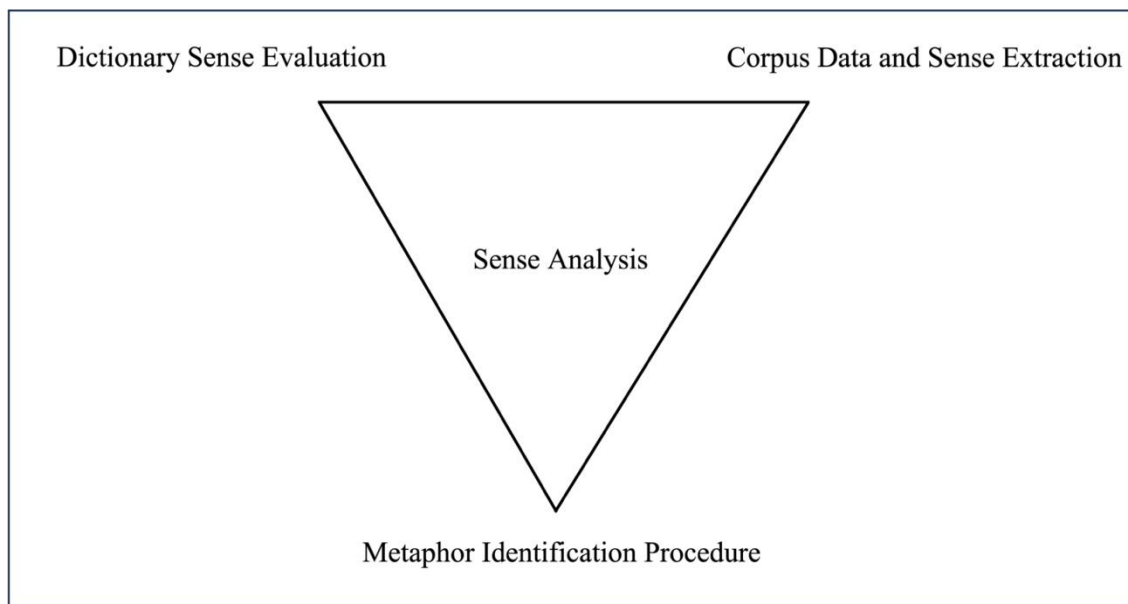
Note: Triangulation is called thus because one can use multiple methods in the procedure. These can be represented as vertices of a triangle that "contains" the data set under analysis. In our case, the data set includes the possible senses for each preposition in the contrast set. The first method/vertex involves the analysis of dictionary entries for these prepositions. The second method/vertex involves the extraction of corpus data (i.e. sentences including these prepositions). The third method/vertex involves sense evaluation of the corpus data performed via the Metaphor Identification Procedure.

We applied the triangulation method as follows. First, we analysed the relevant dictionary entries in three Italian dictionaries of modern Italian (De Mauro, 2020; Gabrielli, 2020; Zingarelli, 2022). We thus collected a list of possible senses for each preposition, along with the set of examples used in the dictionaries to illustrate these senses. Second, we collected sentences from PAISÀ, a web-based corpus of written Italian featuring 250 million words (Lyding et al., 2014; Baroni & Bernardini, 2016). Though other corpora of Italian exist (e.g. the *La Repubblica* Corpus, Baroni et al., 2004), PAISÀ includes several features (e.g. search via part-of-speech selection) that made our analysis more streamlined. The use of corpus data thus allowed us to find natural occurrences for prepositions in sentences (cf. Deignan, 2005; 2014). Third, we applied a sense evaluation procedure to the corpus data. Hence, we verified whether these prepositions may cover senses not attested in the dictionaries. Conversely, we verified if the dictionaries included senses not attested in the corpus.

The sense evaluation was performed via the *Metaphor Identification Procedure* (e.g. Group, 2007; Reijnierse et al., 2018; Steen, 2011). This procedure involves four steps to identify metaphoric uses of vocabulary items and constructions in discourse. First, a researcher reads a text to grasp its general sense. Second, the researcher segments the text into minimal units (e.g. prepositions, nouns, verbs). Third, the intended sense of each item in context is evaluated, establishing whether other, more basic (e.g. more concrete) contemporary meanings are possible (e.g. spatial vs temporal senses in prepositions). Fourth, if the unit in context does not have a basic meaning, then its metaphoric meaning is identified. Meaning types so defined can then be recorded and organised for further analysis. For our purposes, it was crucial to identify

sense (i.e. meaning) and sense types for the sentences collected from the corpus. We thus adapted the task as follows.

First, temporal senses were considered such when the complement NP described a temporal referent. We evaluated if prepositions introduce *reference times*: temporal entities at which some eventuality holds (e.g. instants, intervals; cf. Comrie, 1985; Croft, 2012; Fauconnier & Turner, 2003). Second, state senses were considered such when a preposition would either follow the copula (i.e. *essere* 'to be') or a psych verb (e.g. *spaventarsi* 'getting scared', see Evans, 2009; 2010). The preposition's NP complement would then describe a physical or abstract state (e.g. *fatica* 'fatigue', *guai* 'trouble', respectively). Third, fictive motion examples were considered such when figure NPs referred to non-agentive moving entities (e.g. clouds in (4)), or 'located' entities (i.e. 'fictive location', see Talmy, 2000; Walínski, 2018). Fictive senses require clarification regarding their syntactic status and whether that status confirms the existence of this sense type for prepositions. We offer this clarification by discussing the relevant data.

After assigning each example to a sense type, we analysed spatial senses to individuate their semantic dimensions of variation and the possible semantic contrast that these senses form. We analysed whether non-spatial senses could be interpreted as involving mappings to other sense types. This assumption is consistent with cognitive linguistics approaches (e.g. Evans, 2009; Grady, 1997; Tyler & Evans, 2003), and previous findings on Italian prepositions (Bjelobaba, 2018; Luraghi, 2009; 2011; Taylor, 1988). Conceptual semantics also analyses non-spatial senses as isomorphic to spatial senses (e.g. Jackendoff, 1983; 1992). We thus assumed that the temporal, state and fictive senses associated to each preposition could be derived from the spatial senses, and that corpora data would provide cues supporting this assumption. The next section contains the results of our analysis.

4   The results

We found 10134 tokens for *per*, 9030 tokens for *tra/fra* (6689 for *tra*, 2341 for *fra*), and 8842 for *attraverso* (1121 including *a*; 7721 without it). As *fra* is generally treated as a spelling variant (allomorph) of *tra*, we analysed the data for both jointly. We then found nine distinct sense (sub-)types for *per*, seven for *tra* and four for *attraverso*; we will clarify the role of fictive senses in the remainder of this section. Each example reported in the following discussion represents the first attested example for a given sense and sense type. We have omitted references to the corpus in the examples, since each example invariably originates from the PAISÀ corpus. We will discuss the data according to this order (i.e. first the *per* data, then the *tra* and *attraverso* data).

To facilitate the presentation of the data, we will introduce the following descriptive labels. The preposition's NP denotes the landmark object or *ground* when a preposition has a literal or fictive motion sense (e.g. *le montagne* in (1), (4), see Talmy, 2000, p. 3–30). The subject of sentences including PPs is labelled the located entity or *figure*, in literal, temporal and fictive cases (e.g. *ragazzi* in (1)–(2), *le nuvole* in (4): Talmy, ibid.). The NP denotes the (reference) *time* of an event, when it has a temporal sense (e.g. *Natale* in (2), see Fauconnier & Turner, 2003; Haspelmath, 1997). In state sense types, the complement NP/VP denotes the *state* holding for the *experiencer* that the subject NP introduces (Croft, 2012; Evans, 2010). In (3), the VP *per aiutare suo fratello* 'to help his brother' is the complement of the preposition *per*, and introduces the reason why the experiencer (i.e. the person called *Luigi*) remains at home.

4.1 *Per*

Each consulted dictionary suggests that *per* covers three spatial senses. In our terminology, the ground is conceived as having a non-trivial extension along the lateral axis. The figure may thus be located (static sense) or may be moving 'across' this axis (dynamic sense). A third distinct sense involves a figure reaching a ground as a destination, possibly crossing other implicit locations. For instance, in (5) a person called *Gita* scatters some objects, which thus lie 'across' the ground. In (6), Mario is described as walking across a city as the relevant ground. In (7), some militia groups move towards Rome after a commander's order:[5]

(5) *Gita   le   lancia   da   -l   suo   albero   e   si   disperdono*
     Gita   them   throws   from-   the   his   tree   and   REFL   scatter
     PER il   terreno.
     per the land
     'Gita throws them from his tree and they scatter across the ground.'

(6) *Mario   passeggia   per la   città   di   notte.*
     Mario   walks   PER the   city   of   night
     'Mario walks across the city at night.'

(7) *Le   milizie   si   dirigono   per Roma   dopo   l'ordine*
     The   militias REFL   direct   PER Rome   after   the.order
     de-l   comandante.
     of-the   commander
     'The militias move to Rome after the commander's order.'

We suggest that (5)–(7) share a 'section' component or feature in their senses. *Per* can introduce a reference to a lateral cross-section of a given ground (cf. Zwarts, 2008; on English *through*, *across*). These three senses differ along the 'direction' feature dimension. Using labels introduced in Conceptual Semantics (e.g. Jackendoff, 1983; 1992), we argue that (5) introduces a 'locative' sense feature, (6) a 'route' feature, and (7) a 'goal' sense feature, all possible values of the 'direction' feature. The first feature describes a relation between figure and ground as not changing over time. The second feature involves undirected movement 'across' a ground; the third, movement towards a 'goal'. We represent these complex senses via the pre-theoretical notation 'direction, section': for instance, 'locative, section' is the sense for *per* instantiated in (5).

For temporal senses, the dictionaries suggest that only two senses are attested. One introduces the 'duration' of some event; the other, the 'goal' by which some action should be performed. We confirm the existence of these two senses via (8)–(9). In (8), the PP *per cinque anni* describes the 'duration' of Warren's working period, and the NP *cinque anni* introduces the length of the relevant interval. In (9), the PP *per Settembre* introduces the 'deadline' by which some workers must complete modifications; the NP *Settembre* introduces the relevant month. We suggest that these senses respectively correspond to the 'route, section' and 'goal, section' spatial senses, transposed onto the temporal domain. The first sense introduces the

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5 Though very rare (N = 21 in the corpus for *per*), indexical NPs can occur as grounds with any of these three senses (e.g., *passiamo per di qui* instantiating the 'route, section' sense). We do not discuss these specific cases for this preposition or for *tra* and *attraverso* due to length requirements.

interval 'across' which some event holds. The second sense introduces a temporal period as a 'goal' of some event:

(8) *Warren lavorò per cinque anni in alcune ditte private.*
Warren worked PER five years in some companies private
'Warren worked for five years for some private companies.'

(9) *Gli operai avr-anno finito le modifiche per Settembre.*
The workers have-FUT finished the modifications PER September
'The workers will have finished the modifications by September.'

The dictionaries also report three senses for *per* that may qualify as state senses. In our terminology, the first sense describes an experiencer as being 'in' or 'across' a state or condition, without changes in location across time (e.g. *il partito* introducing an experiencer in (10)). The second state involves the introduction of an experiencer as a beneficiary/recipient of some state/action (e.g. the relative NP *chi si prostituisce* in (11)). *Per* can introduce the 'cause' of a state ascribed to an experiencer (e.g. being sad in (12); the VP *non…figlie* introduces this 'cause' of sadness for the speaker *qua* the experiencer). Only one fictive sense seems attested for this preposition in dictionaries and in the corpus. The non-agentive trail in (13) is understood to extend on a 'route' across woods, somewhere in Veneto. We suggest that (10) introduces a state counterpart to the spatial 'route, section' sense, and that (11) introduces a 'result' state, the (metaphoric) 'goal' of some previous event. Instead, 'cause' states can be conceived as the 'sources' of events (cf. (12); Jackendoff,1983; 1992):

(10) *Il partito è passato per fasi molto difficili, ma è so.far*
The party is passed PER phases very difficult but is *finora*
sopravvissuto.
survived
'The party has endured very difficult phases, but has so far survived.'

(11) *Il problema persiste, nonostante si-ano previste multe per chi*
The problem persists notwithstanding are-SUBJ planned fines PER who
si prostituisce.
REFL prostitutes
'The problem remains, even though fines are expected for those who prostitute themselves.'

(12) *Io sono molto triste per non aver pot-uto vedere le*
I am very sad PER not have-INF can-PST see-INF the
tue figlie.
your daughters
'I am very sad to not have been able to see your daughters.'

(13) *Il   sentiero passa   per i   boschi   Euganei.*
  The trail passes PER the woods Euganei
  'The trail passes across the Euganei woods.'

From these data, we can conclude that *per* seems to involve two dimensions of polysemy. It can cover values associated with the 'direction' feature in its 'locative', 'route' and 'goal' values, thus realising a form of regular polysemy. It can then cover different sense types (spatial, temporal and state: logical polysemy). State senses seem to include a 'source, section' sense transposed to the state domain that is not attested in the other domains/types, thus creating an asymmetry. Crucially, the fictive type seems to hinge on the sense assigned to the figure as an argument of the verb, and thus seems to emerge at a sentential rather than PP level. Temporal and state senses emerge via the sense assigned to a preposition's complement NP or VP, instead. Central to all these senses is a semantic feature that we label as 'section', since a PP headed by *per* refers to some section or part of a ground, temporal interval or event possible state.

4.2 *Tra (and fra)*

All three dictionaries confirm that *tra* and *fra* cover two spatial senses. In our terminology, these senses establish that a figure is either located in a space 'among' two or more grounds (cf. (14)), or moves 'across' these grounds (cf. (15)). This space can be considered a 'section' of a larger space defined via the grounds, especially if a lateral axis can be defined. We suggest that the first sense combines the 'location, section' features; the second, the 'route, section' features. The dictionaries report only one temporal sense: *tra* can take an NP introducing the interval during which some event occurs (cf. the PP *tra una settimana* in (16)). We suggest that this sense corresponds to a temporal transposition of the 'location, section' sense:

(14) *Se   ti   trovi   seduto   tra due   poltrone   vuote,   puoi   goder-ti*
  If you find sit TRA two chairs empty can enjoy-you
  il film   in tranquillità.
  the movie in tranquillity
  'If you find yourself sitting between two empty chairs, you can enjoy the movie in peace.'

(15) *Chi   va   da   Cividale a Manzano   cammina   fra i   Colli*
  Who goes from Cividale at Manzano walks TRA the hills
  Orientali de-l   Friuli.
  Eastern of-the Friuli
  'Those who go from Cividale to Manzano walk among the Eastern hills of Friuli.'

(16) *L'incontro   co-l   capo   è   tra una settimana.*
  The meeting with-the chief is TRA one week
  'The meeting with the chief is in one week.'

The dictionaries also report three state senses. These senses, in our terminology, can describe an experiencer as either being between conditions (i.e. metaphoric 'locations') that must be avoided (cf. (17)), or between 'sources' of a state of listlessness (cf. (18)). A 'comparison' sense can also emerge when an experiencer is described as one of many individuals possessing certain

skills (cf. (19)). We propose that this is a 'route' sense involving a scale of measurement conceived as a complex state. A scale can include "bottom" and "top" states representing the values associated with experiencers (in (19), having tennis skills). That is, the experiencer Mario is associated with a possible state located 'across' or 'along' the tennis skill levels/states forming this scale. Attested fictive senses involve the 'route' sense displayed in (4b) and a 'locative' sense: an inanimate figure can extend itself across the section of two or more grounds (cf. (20)):

(17) *Alī   si   sbarazzò de-i   Kharigiti per evit-are   di   essere   preso   tra*
     Alī REFL   got.rid of-the Kharigiti per avoid-INF   of be.INF   caught TRA
     due fuochi.
     two fires
     'Alī got rid of the Kharigirites to avoid being caught between two fires.'

(18) *Giuseppe   non riposa   molto,   tra lavoro   e   famiglia.*
     Giuseppe   not rests   much   TRA work   and family
     'Giuseppe does not rest much, because of work and family.'

(19) *Mario   è   fra i   piú   forti   tennisti   de-lla   città.*
     Mario   is   TRA the more   strong   tennis.players   of-the   city
          'Mario is among the strongest tennis players in town.'

(20) *La Georgia era una zona-chiave   che stava   fra due colonie.*
     The Georgia was one zone-key   that stayed   TRA two colonies
     'Georgia was a key zone that lay between two colonies.'

Overall, *tra* and its allomorph *fra* cover spatial senses also centred on the 'section' sense, which can then combine with the directional 'route' and 'locative' senses. Only the attested temporal sense acts as a mapping of the 'location' sense. Instead, 'property' and 'cause' senses emerge in the state domain, as counterparts of the spatial 'location' and 'source' senses. A 'comparison' sense acts as a mapping of a 'route' sense: one can describe an experiencer as having a certain property/state at a certain degree 'along' or 'across' a scale. As in the case of *per*, sense selection seems to hinge on the contribution of complement NPs. Verbs and figure NPs, instead, seem to determine the fictive type (cf. (20)). Emergence of some shared senses (e.g. the 'route, section' and 'locative, section') with *per* becomes evident, but differences also seem to take shape (e.g. the lack of a 'goal, section' sense). Similarly, *tra* displays forms of regular polysemy in its multiple senses, and logical polysemy in its multiple sense types.

4.3 *Attraverso*

All three dictionaries report that *attraverso* describes one spatial relation. In our terminology, a figure covers the ground's main 'section' by following a certain 'route' (cf. (21)). For this preposition, we attested a small but meaningful asymmetry in its definition between Gabrielli (2020) on the one hand, and De Mauro (2020) and Zingarelli (2022) on the other hand. According to the first dictionary, *attraverso* may also license uses in which the figure's trajectory lies entirely within a ground's 'section' (cf. again (21)). However, this element of convexity is not attested when multiple grounds are involved (cf. Hoelbeek, 2015; 2017). For

the single attested temporal sense, *attraverso* introduces some event holding 'across' one or more intervals of time that the ground NP refers to (cf. (22)). A similar analysis can be extended to the single state sense, which involves some form of 'change' that possibly lasts 'across' a given, single interval of time (cf. (23)). One fictive motion sense is fully attested when a figure lies 'across' the ground(s) and a 'section' related to this ground (cf. (24)):[6]

(21) *Il   sovrano   procede   attraverso   la   galleria   reale.*
     The sovereign   proceeds   ATT   the   gallery   royal
     'The sovereign proceeds through the royal gallery.'

(22) *Il   Milan   è   passato   attraverso   una fase   di   ristrutturazione   intensa.*
     The Milan   is   passed   ATT   one phase   of   restructuring   intense
     'AC Milan has gone through a phase of intense reorganisation.'

(23) *Qualunque   soggettività   politica   nuova   va   construita   attraverso*
     Whatever   subject   political   new   goes   built   ATT
     un'esperienza   di   lotta.
     an.experience   of   struggle
     'Any new political subject has to be built through experiences of struggle.'

(24) *Il   Po   passa   attaverso   svariate città   de-l   Nord.*
     The Po   passes   ATT   various   cities   of-the   North
     'The Po passes through various Northern cities.'

We conclude that *attraverso* combines the 'section' and 'route' features into a single complex sense, and that this complex sense is mapped to the other sense types. The lack of variation along the 'direction' dimension suggests that this preposition may be one of the few unambiguously directional prepositions in Italian (cf. Hoelbeek, 2017). As for *per* and *tra*, complement NPs play a crucial role in sense type selection, except for fictive sense types. Once more, this sense type seems to emerge at a sentential level, but nevertheless seems associated with prepositions and the PPs they head. We can thus observe that *attraverso* only seems to realise a form of logical polysemy; one spatial sense is transposed onto the other semantic types/domains.

    Let us summarise. The contrast set including *per*, *tra* and *attraverso* seem to share a core semantic feature of their spatial sense that we have glossed as 'section'. Each preposition also covers a complex sense that we have glossed as 'route, section', describing a figure moving 'across' the cross-section of a ground (cf. (6), (15), (21)). This fact confirms our initial observation in (1), i.e. that each of these prepositions can occur in sentences describing such a spatial relation holding between figure and ground. Other senses seem to overlap only in part. For instance, *per* and *tra* share a 'location, section' describing the figure as being located 'across' a ground that *attraverso* lacks (cf. (5), (14)). Furthermore, the non-spatial (temporal, state) senses associated with each preposition do not necessarily correspond to their respective spatial senses. For instance, *per* and *tra* only include 'source' features in their state senses (cf. (12), (18)). We thus have evidence suggesting that these prepositions are related via inter-lexical

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6 The presence of the optional *a* seemed to mark a discourse-specific ground, but often the examples did not offer crucial evidence regarding the contribution of this head. We defer the reader to Tortora (2008) and Ursini (2015) for discussion.

polysemy centred on their spatial sense. With this data at our disposal, we now offer our theoretical account.

5   The account: Semantic maps for cartographic structures

Our account combines the generative framework known as "Cartography" (e.g. Cinque & Rizzi, 2010) with the Semantic Maps framework (e.g. Haspelmath, 2003). We pursue this semasiological treatment of the data (i.e. from "form" to "meaning") for two reasons. First, cartographic accounts offer treatments of prepositions that associate semantic dimensions/features with morpho-syntactic units ("heads": cf. also Svenonius, 2008; 2010). Via this treatment, we can analyse these prepositions as involving the same order of heads, the same semantic values associated with some of these heads (i.e. 'section'), and different semantic values with the other constituting heads (i.e. 'direction'). Second, these treatments allow us to also pin-point the semantic contribution of figure and ground NPs, as well as VPs. Though other grammatical accounts of Italian prepositions certainly exist (e.g. Ganfi & Piunno, 2017; Piunno & Ganfi, 2019; 2020), this account seems more germane to our explanatory goals.

In Cartography, lexical and functional categories are associated with rich morpho-syntactic structures in which each possible semantic feature is connected to a projecting syntactic head. These heads form sequences of elements that act as projections or "maps" of traditional categories. For instance, Cinque and Rizzi (2010, p.18–22) proposes that adpositions may correspond to the sequence of several (up to 20) heads carrying each of the features cross-linguistically associated with this category. For Italian, a more conservative but empirically motivated model is offered in Franco (2016), Ursini (2015) (cf. also Franco, Manzini & Savoia, 2021; Garzonio & Rossi, 2016; Ursini et al., 2023). These works build on Svenonius's (2008; 2010) analysis of English prepositions and suggest that Italian prepositions minimally include four distinct heads or projections: Path, Place, AxPart and Kase. We illustrate the semantic content and morpho-syntactic order of these heads in Italian prepositions via the examples in (25):

(25) a. [$_{PathP}$ Ø [$_{PlaceP}$ di [$_{AxPartP}$ fronte [$_{KP}$ a [$_{DP}$ -l tavolo]]]]]
    b. [$_{PathP}$ Ø [$_{PlaceP}$ per [$_{AxPartP}$ Ø [$_{KP}$ di [$_{DP}$ qui]]]]]
    c. [$_{PathP}$ Ø [$_{PlaceP}$ Ø [$_{AxPartP}$ tra [$_{KP}$ di [$_{DP}$ noi]]]]]
    d. [$_{PathP}$ Ø [$_{PlaceP}$ at- [$_{AxPartP}$ traverso [$_{KP}$ (a) [$_{DP}$ -i campi]]]]]
    e. [$_{pP}$ Ø…[$_{StateP}$ Ø…[$_{PathP}$ Ø [$_{PlaceP}$ di [$_{AxPartP}$ fronte [$_{KP}$ a [$_{DP}$ -l tavolo]]]]]]]

Consider first the PP *di fronte al tavolo* 'in front of the table', which includes the preposition *di fronte a* 'in front of'. The head K(ase) takes a DP as a preposition's complement, and may *conflate* with a definite article (e.g. *a* and *il* 'the.sg.ml' form *al* in (25a)). *Conflation* is defined as the combination of adjacent heads or words into one item (Hale & Keyser, 2002; Talmy, 2000). The head K also assigns a semantic role to its complement phrase, which may vary considerably in nature due to its inherent polysemy. For instance, nominative and accusative case markers can project this head and can assign different semantic roles to their complement phrases (e.g. 'subject', 'agent' for the nominative case). Our innovation, as we explain in the remainder of this section, is to assume that it can also determine the sense type (e.g. spatial, temporal) of a full PP.

The KP that these elements form becomes the complement of an Ax(ial)Part head: e.g., *fronte* 'front' in (25a). This head may lack an overt realisation (e.g. *per* in (25b)), but it nevertheless forms an AxPartP as a result. AxPart heads denote the specific location(s), axis or object part that may be involved in a relation between figure and ground in spatial relations (cf. Svenonius, 2006; 2010). For instance, *fronte* in (25a) refers to a table's front axis, which is in turn defined by assuming that a table can have distinct parts (e.g. a back, two sides, a front), and axes defined via these parts. For our triplet of prepositions, we assume that this head denotes a 'section' sense, in line with our data analysis. The Place head (e.g. *di* in (25a), *per* in (25b)) may form a PlaceP even when silent (cf. (25c–d)). Place denotes the location/orientation associated with the ground. Path is a generally silent head, in Italian (cf. Folli, 2002; Tortora, 2005), but determines the direction/motion that a figure follows, with respect to a ground.

The structures we can assign to *per*, *tra* and *attraverso* via this analysis involve an optional head: *di* for *per* and *tra* (cf. (25b–c)); *a* for *attraverso* (cf. (25d)). The historical roots of *tra* and *attraverso* lie in Latin constructions *in tra* and *ad traversum*, from which conflated *tra* and *attraverso* have emerged (cf. respectively, Gabrielli, 2020; Hoelbeek, 2017). In modern Italian, the diachronic origins of these prepositions have become opaque, though their internal structure can still be gleaned; we propose our segmentation based on this latter fact. *Per*, instead, may also occur in complex prepositions, preceding nominal-like terms (e.g. *per mezzo di* 'by means of', see Ganfi & Piunno, 2017). For this reason, we propose that these prepositions conflate Place and AxPart heads into a single head, resulting in a single exponent realising both categories. Path as a silent head, we suggest, also became conflated with these heads. Since cartographic approaches use DPs as phrases standing proxy for the fine-grained structures assigned to NPs and their extended projections, we adopt this label for the remainder of our analysis.

We can capture the more parsimonious nature of our account by analysing (25e), which approximates a richer cartographic approach. Models such as that of Cinque & Rizzi (2010) do not offer language- and item-specific analyses of the 20 or more heads projecting from prepositions. In (25e), we indirectly capture this fact by explicitly representing the "small p" head and the State head. Small p is the head potentially introducing a figure DP in modifier-like PPs (e.g. *la sedia di fronte al tavolo* 'the chair in front of the table'). State, instead, is the head introducing a sense type assigned to a PP (e.g. spatial, temporal). Crucially, our analysis suggests that most of these heads would be empty, or more accurately, they would conflate with the morphemes clearly projecting the attested heads. Our analysis is thus more parsimonious because it assumes a minimal set of heads for our contrast set of prepositions, and motivates these heads via the empirical findings.

Our next step involves a recent proposal that connects morpho-syntactic conflation and semantic polysemy. Some cartographic works suggest that polysemy in prepositions emerges as the by-product of heads undergoing conflation (e.g. Acedo-Matellán, 2016, for Latin; Romeu, 2014, for Spanish; Ursini 2020, for a small typological sample). For instance, Romeu (2014) suggests that Spanish *enfrente de* 'in front of' includes the AxPart item *frente* 'front', which restricts the preposition's polysemy range to denote 'front' locations. However, this preposition can cover either 'goal' or 'location', for the 'directional' sense because the Axpart *frente* conflates with *en*, a realisation of the Path and Place heads. The simple preposition *en* may cover a richer set of senses because it does not express a specific semantic value/feature for the AxPart head (Romeu, 2014, p. 90–125). Thus, the regular polysemy of prepositions can be potentially analysed as a result of their constituting heads undergoing degrees of conflation.

Crucially, cartography offers three predictions when extended to our data. First, Italian prepositions can be polysemous with respect to the 'direction' feature that Path expresses. Our contrast set confirms this prediction via their 'location', 'route', 'goal', 'source' senses. Second, prepositions can share at least one sense when the conflated Place and AxPart heads introduce the same feature value. *Per*, *tra* and *attraverso* indeed share the 'section' feature, projecting from AxPart. Third, K can be treated as the head selecting a sense type. Its combination with a complement DP or VP determines a 'spatial', 'temporal', 'state' or 'fictive' type for a PP. Our triplet of prepositions also confirms this prediction, and licenses one emergent prediction. Inter-lexical polysemy relations hold when prepositions share some but not all features/senses associated with their constituting heads, irrespective of their status as primary or non-primary senses. Our data in (1)–(24) suggest that this prediction is correct. However, cartography does not give us the tools to analyse these inter-lexical polysemy relations. For this purpose, we must introduce the Semantic Maps framework.

Semantic maps can be conceived of as structured representations of meanings/functions (senses, in our parlance: e.g. Grossman & Polis, 2017; Georgakopoulos & Polis, 2018; 2021; 2022).[7] Unlike radial sense networks, semantic maps eschew the use of primary senses and radial sense relations. Semantic maps have two components: *conceptual spaces* (or models, see Croft & Poole, 2008), and *lexical matrices*. Conceptual spaces represent possibly non-linguistic concepts that languages can express (e.g. colour, space, see Regier et al., 2013). Lexical matrices present senses/functions attested in a language, and are then assigned to each vocabulary item in a category. Conceptual spaces are represented as either connected graphs (i.e. "classical" maps, see Croft, 2003; Haspelmath, 2003; Levinson & Meira, 2003; Zwarts, 2010), or as Euclidean spaces (i.e. "distance-based" maps, e.g. Croft & Poole, 2008; Regier et al., 2013).

Both formats can represent how senses are connected to form a semantic space associated with one or more words. Classical maps, however, allow researchers to explicitly represent semantic relations as edges in graphs, and senses as nodes. Classical maps are therefore a more germane format to represent inter-polysemy: the sense ranges of prepositions are "maps" covering nodes/senses, and inter-lexical polysemy emerges in the form of shared regions among maps. We adopt the "analytical primitive principle", which states that maps should represent atomic senses as nodes in a semantic domain (Cysouw, 2010; Grossman & Polis, 2017). Since we assume that each preposition involves the conflation of multiple heads and their possible senses into single exponents, we must represent their complex senses as nodes. We can thus conceive of distinct semantic features as 'quarks' of these atomic senses: dimensions of variation that cannot be studied in isolation, at least in Italian. This seems in line with most assumptions in lexical semantics about semantic features (Cruse, 2004; Jezek, 2016; Nida, 1975).

Before we move to our map, we must offer a *proviso* on the Place head. According to cartographic analyses, Place heads only affect the interpretation of AxPart as denoting spatial locations. While *fronte* 'front' is a noun denoting a body part, *di fronte* becomes part of a spatial preposition and denotes a corresponding position/place (Svenonius, 2006; 2008). In pre-theoretical terms, *di* as a Place head determines that *fronte* as an AxPart corresponds to the sense 'front, position' rather than 'front, object'. Our analysis of the data suggests that *per*, *tra* and *attraverso* always define the 'section' of a ground as a possible 'position' for the figure,

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7 These works use the term "co-lexification" to indicate that one vocabulary item can cover or realise (i.e. "co-lexify") several senses. We prefer the term "cover" for its more theory-neutral import.

though this 'position' may be defined along spatial, temporal and stative dimensions. We thus incorporate this subtle semantic feature into our maps accordingly.

Let us move to the map. We adopt the analytical primitive principle, and thus we obtain a set of atomic senses that we represent via the frame-like schema AT_i=<*direction(v), position, section, type*> (cf. Fillmore & Baker, 2012). A 'direction' feature specified for a value *v* (with *v={location, goal, route, source})* combines with a 'position' and a 'section' feature. We thus predict that the triplet of prepositions under discussion can potentially cover one of four sense triplets: <*location, position, section*>, <*goal, position, section*>, <*route, position, section*>, and <*source, position, section*>. We then assume that the Kase head introduces sense types via its combination with a complement NP or VP. For each possible sense pair, we assign the pair to one of the four sense types, i.e. *t={spatial, temporal, state, fictive}*. Thus the schema <*direction(v), position, section, type(t)*> represents the possible senses associated with *per*, *tra* and *attraverso*.[8] As such, the *i*-th atomic sense in the map is a quadruplet of semantic features.

Our semantic map includes 4 (Path) x 1 (Place) x 1 (AxPart) x 4 (Kase) = 16 possible senses, over which our prepositions find their possible sense ranges. Consider Figure 2:

[$_{PathP}$ 'direction' [$_{PlaceP}$ 'position' [$_{Axpart}$ 'section' [$_{KaseP}$ 'sense type']]]] $\Longrightarrow$

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8 We could represent the 'section' feature as part of a larger set of values (e.g. '+vertical' for prepositions such as *up* and *sopra*). We leave such a generalisation aside, to better focus on our data. We nevertheless touch upon this aspect in the discussion.

Figure 2

The semantic map for per, tra *and* attraverso.
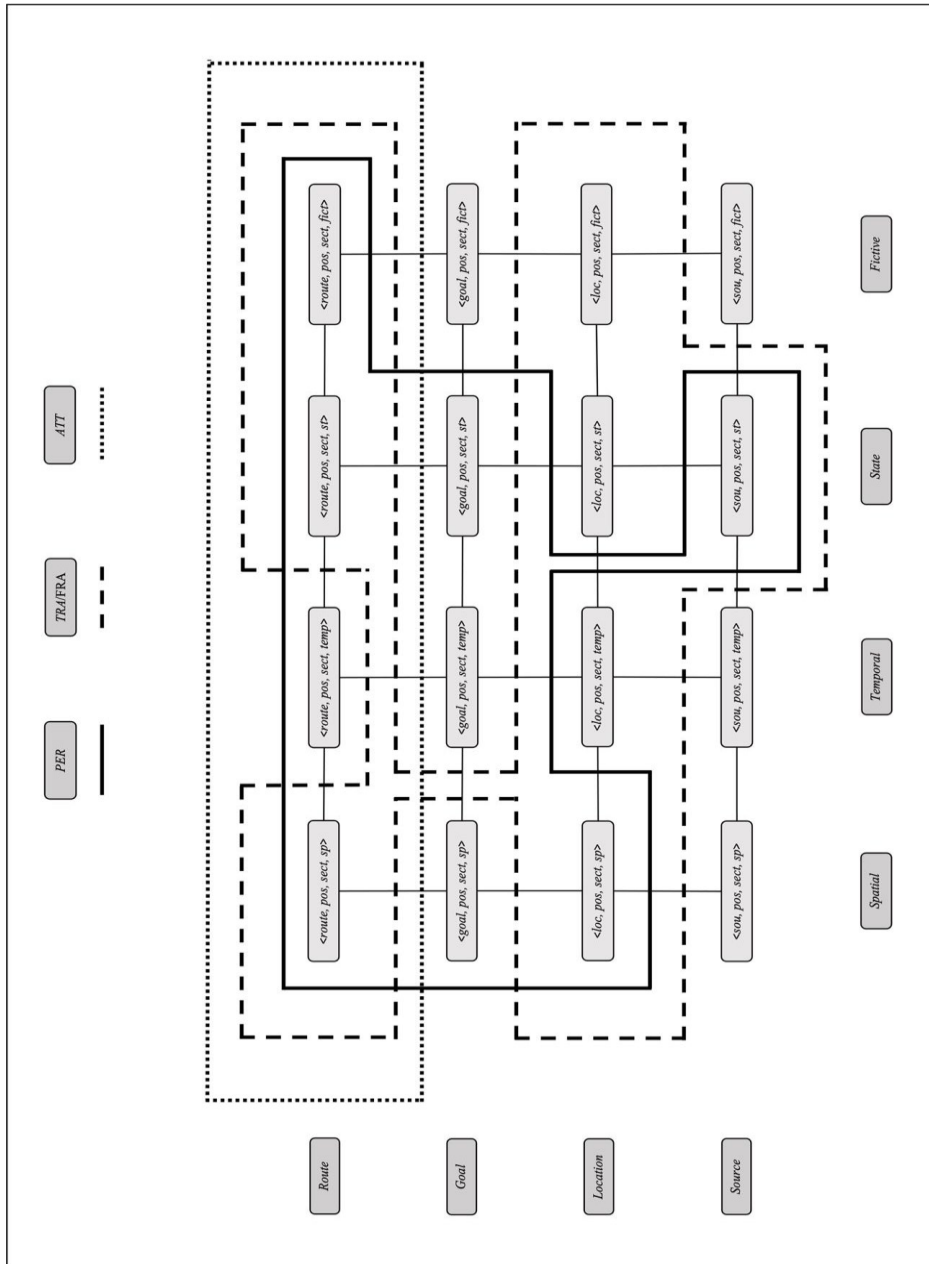
Note: The right arrow connecting the structure above the map with the map itself can be pre-theoretically interpreted as representing this specific mapping of structures to sense domains. Semantic sets of prepositions are shown as outlined regions of this map: solid outline = *per*, dashed outline = *tra/fra*, dotted outline = *attraverso*. From the map, we can infer the patterns attested in (1)–(4). All three prepositions can cover the top left-most sense attested in (1) and its mirror fictive counterpart in (4). However, only *per* can cover the temporal sense in (2) (cf. the second row, second column node) and the state sense in (3) (third column node, second row node). Lines in the map represent relations among values for semantic features. Thus, possible values for the 'direction' feature are connected via vertical lines (e.g. 'route' in the first row, 'goal' in the second row). Possible values for the sense 'type' are connected via horizontal lines (e.g. 'spatial' for the first column, then 'temporal', 'state' and 'fictive' values). For a clearer representation, the eight possible values are labelled in dark grey on the left ('direction' feature) and at the bottom (sense 'type').

As foreshadowed in § 4, sense coverage in *per* and *tra* involves asymmetries. For instance, *per* and *tra* cover 'source' senses only specified for the 'state' type. In LCCM, these asymmetries are analysed as a result of diachronic change (cf. also Brinton & Traugott, 2005; Tyler & Evans, 2003). Thus, senses may have emerged over time via extra-linguistic contexts in which other senses became acceptable for a preposition. Repeated use over time allowed the use of prepositions for these seemingly unconnected senses. The Semantic Maps approach also suggests that diachronic forms of sense evolution underpin the principles by which vocabulary items can extend their sense domains (e.g. Georgakopoulos & Polis, 2018). Thus, the attested asymmetries set may be reduced to the pragmatic emergence of new senses (i.e. "past" forms of novel polysemy) that were then inserted in each preposition's sense network.

We think that an alternative, grammar-internal account is possible via the "career of metaphor theory" (Bowdle & Gentner, 2005; Gentner & Wolff, 2000; Wolff & Gentner, 2000; 2011). According to this theory, sense extension from one source domain (here, spatial senses) to other domains (e.g. state senses) follows the principles of "alignment" and "projection". Alignment maps senses from one domain to another domain; projection determines that sense extension involves other senses within a certain domain. Alignment thus predicts that spatial senses can be mapped to other domains/types (i.e. sense extension moves "to the right", in our map). Projection predicts that new potential senses may involve both other senses within a domain (i.e. senses "below" the 'route' sense, in our map). Mappings are assumed to be initially inconsistent (i.e. predicted senses are not covered) but may become progressively more consistent or "symmetrical": words may cover senses that are projections of established senses.

These predictions seem to partially hold in our case. For *attraverso*, alignment is confirmed: this preposition's senses form a row within the map, but are limited to one 'direction' sense value. In the case of *tra*, alignment is only attested for its *<goal, position, section, temporal>* sense. The other senses display limited forms of alignment. Projection, however, predicts that the missing senses may emerge as novel senses for these prepositions. Thus, it is possible that these prepositions may not cover these senses, or that no examples were found in the PAISÀ corpus when we extracted the data. Forms of novel polysemy could thus involve the sense extension of either one of these prepositions to cover these senses in future developments of the language.

One conjecture that we wish to propose is the following. At some future moment, *tra* and *attraverso* could also cover a *<goal, position, section, temporal>* sense, like *per*. This could happen once speakers start accepting sentences such as (2b–c) as interpretable. That is, when speakers confirm that *I ragazzi si preparano fra/attraverso Natale* would cover the sense 'the boys are getting ready for Christmas'. In this case, the sentences would be synonymous with *I ragazzi si preparano per Natale*, i.e. (2a). Our theory predicts this is a possible evolution of prepositions' senses, though these prepositions currently lack these senses (i.e. they do not cover the second row, second column node in the map, cf. Fig. 2). Even if the native speaker author of this paper finds both possibilities subjectively unpleasant, time and speakers' use of these prepositions may lead to such a change.

Overall, our syntactically-informed map can make predictions about possible senses and the polysemy forms they realise. It also allows us to confirm our initial assessment of the problems that LCCM would face in the analysis of (1)–(4). If we assumed that 'section' may be the primary sense of each preposition, we would not be able to distinguish these prepositions' sense networks: by definition, they should involve distinct primary senses. Our syntax-driven interpretation of the data suggests instead that sense variation hinges on how these prepositions can cover distinct senses associated with heads undergoing conflation. The common AxPart

sense value (i.e. 'section') and its conflation with senses associated to Path, K(ase) and Place heads determines the inter-lexical polysemy of this triplet of prepositions. Since no semantic dimension is taken as primary, no risk of incorrect predictions arises from our analysis, unlike in LCCM. Each head equally contributes to the semantics of a preposition, as indirectly assumed in Cartography. We have thus achieved our goal: offering an account of the inter-lexical polysemy relations connecting *per*, *tra* and *attraverso* as a contrast set. We turn next to the discussion.

6   Discussion and conclusions

We believe that three key results emerge from our account.

First, our account of *per*, *tra* and *attraverso* emerges by adopting the triangulation method. We tested whether the dictionary senses proposed for these prepositions (in e.g. Gabrielli, 2020) can be confirmed via the naturalistic data of the PAISÀ corpus (e.g. Baroni & Bernardini, 2016). Furthermore, we applied the Metaphor Identification Procedure (e.g. Steen, 2011) as a general method to individuate the different senses and sense types that these prepositions can cover. We thus obtained a robust empirical coverage of the possible senses for these prepositions, and offered evidence beyond (1)–(4) about the possibility that these prepositions enter inter-lexical polysemy relations. Our analysis has furthermore shown that each sense can be decomposed in some minimal semantic features (e.g. 'section', the 'direction' features). This is consistent with not only lexical semantics views (e.g. Cruse, 2004; Jezek, 2016; Nida, 1975), but also cognitive and conceptual semantics accounts (e.g. Jackendoff, 1983; 1992; Taylor, 1988). We thus have shown that analyses of the polysemy of prepositions forming contrast sets can be extended beyond English (e.g. Tyler & Evans, 2003) to understudied languages such as Italian.

Second, our account combines apparently sharply distinct approaches into an integrated analysis. We suggest that a parsimonious Cartography account of *per*, *fra* and *attraverso* can involve a minimal set of heads and corresponding semantic features (cf. Franco, 2016; Ursini, 2015; Ursini et al., 2023). We propose that the conflation of these heads and their possible senses (cf. Acedo-Matellán, 2016; Romeu, 2014) modulates the attested polysemy patterns in these prepositions. Though each of these items covers a 'section' feature, the other possible senses associated with each head can vary. Via a Semantic Maps approach, we represent the polysemy of these prepositions as covering several senses within the same semantic space (cf. Georgakopoulos & Polis, 2022; Haspelmath, 2003). Inter-lexical polysemy relations thus emerge as the possibility that prepositions can cover some nodes in a common semantic space. This view is also consistent with standard assumptions in lexical and frame semantics (e.g. Cruse, 2004; Fillmore & Baker, 2012). LCCM (e.g. Evans, 2015; 2019) and other theories using sense networks with primary senses (e.g. Tyler & Evans, 2003) would require some amendments to their assumptions to account for these data.

Before we move to the third point, a theoretical clarification is necessary. We have suggested that the K head determines the sense type associated with a preposition. On the other hand, less parsimonious Cartography approaches introduce a dedicated State head for this function (cf. (25e); Cinque & Rizzi, 2010, p.18–22). Our data seem to support the parsimonious view, at least for Italian: only one head seems necessary to model this dimension of semantic variation. However, this innovation opens the question to whether and how standard senses/functions for K heads (e.g. "nominative", "accusative") are related to the sense types we have discussed in this paper. We believe that a preliminary answer can be formulated along these general lines.

In our account, K heads seem to assign semantic roles (e.g. figure, ground) to their complement DPs and semantic types to the whole PP. In languages that include prepositions and case markers on DPs/NPs, however, a division of labour often exists between prepositions and case markers affixed to DPs/NPs (e.g. Latin, Czech: Caha, 2009; den Dikken, 2018). We propose that these two semantic dimensions may possibly correspond to two case projections that, in our Italian data, are conflated into a single K(ase) head. This is consistent with the view that case markers can involve forms of "case stacking/syncretism". These are situations in which one case marker in one language can cover the semantic functions of several cases in other languages (again, Caha, 2009; den Dikken, 2018). We do not explore this possibility because our prepositions seem to only assign one role to their DPs (informally, 'ground'), but the semantic type can determine which "sub-role" is selected (i.e. 'spatial ground', 'fictive ground', 'temporal ground', 'state'). We leave further explorations for future research, however.

Third, our account could hypothetically be extended to other contrast sets in Italian prepositions. Examples include *da* and *di* (cf. Luraghi, 2009; 2011), *su, sopra* and *al di sopra* (Taylor, 1988) and other preposition clusters (e.g. *di fronte a* and *davanti*, cf. Bjelobaba, 2018). We do not offer such extensions due to length requirements, but observe that the identification of key features composing senses (e.g. '+vertical' for the *su* triplet) could render such extensions empirically feasible. We acknowledge that our account may perhaps not be as fine-grained as previous proposals in the analysis of single senses. For instance, we do not fully explore the possible "functional" senses that speakers can associate with *attraverso*. One example can be a figure moving 'through' a non-hollow ground; another can be a fish moving 'through' the currents of a river (cf. Hoelbeek, 2015; 2017). We, however, suggest that atomic senses may correspond to semantic "regions" of multiple quark-like features, rather than to points (cf. Croft & Poole, 2008; Desagulier, 2022; Regier et al., 2013). Our approach is flexible enough that future extensions may explore these potential "sense regions" in more detail.

In conclusion, the goal of this paper has been to capture the inter-lexical polysemy of Italian prepositions *per, tra* and *attraverso* across their spatial, temporal, state and fictive senses. We have investigated how these senses are related and structure their corresponding domains into a single contrast set. We have shown that their sense relations may define precise semantic maps and the distribution of these prepositions in sentences. Inter-lexical polysemy thus emerges as the possibility that vocabulary items displaying forms of regular (i.e. multiple senses) and logical (i.e. multiple sense types) polysemy also jointly cover some senses. We have then offered an account that combines syntactic Cartography with Semantic Maps and, as such, represents a novel semasiological view on polysemy patterns. Ideally, one would test this rich theoretical model and its use of semantic maps against other contrast sets and extend the proposal to other languages. We leave such endeavours for future work, however.

Abbreviations

Glosses

ATT	sense range for *attraverso*;
FUT	future tense marker;
INF	infinitive marker;
ML	male gender marker;
PER	sense range for *per*;
PST	past tense marker;
REFL	reflexive pronoun;
SG	singular number marker;
SUBJ	subject;
TRA	sense range for *tra*;

Phrases

AxPartP	Axpart Phrase
DP	Determiner Phrase
KP	Kase Phrase
NP	Noun Phrase
PathP	Path Phrase
PlaceP	Place Phrase
PP	Prepositional Phrase
pP	Small p Phrase
StateP	State Phrase
VP	Verb Phrase

References

Acedo-Matellán, V. (2016), *The morphosyntax of transitions: A case study in Latin and other languages*. Oxford University Press.

Apresjan, J. D. (1974). Regular polysemy. *Linguistics, 12*(1), 5–32.

Asher, N. (2011). *Lexical meaning in context: A web of words*. Cambridge University Press.

Baroni, M., Bernardini, S., Comastri F., Piccioni L., … & Mazzoleni, M. (2004). Introducing the *La Repubblica* corpus: A large, annotated, TEI (XML)-compliant corpus of newspaper Italian. In M. T. Lino, M. F. Xavier, F. Ferreia, R. Costa & R. Silva (Eds.), *Proceedings of the fourth international conference on language resources and evaluation* (pp. 1771–1774). European Language Resources Association.

Baroni, M., & Bernardini, S. (2016). Corpus query tools for lexicography. In U. Heid (Ed.), *Lexicography: An international handbook* (pp. 50–58). De Gruyter.

Bjelobaba, S. (2018). *Semantic analysis of spatial prepositions in standard Italian*. [Doctoral thesis, University of Zagreb]. http://darhiv.ffzg.unizg.hr/id/eprint/10519.

Bowdle, B., & Gentner, D. (2005). The career of metaphor. *Psychological Review*, *1121*(2), 193–216.

Brala, M. (2000). *English, Croatian and Italian prepositions from a cognitive perspective: When 'at' is 'on', and 'on' is 'in'.* [Doctoral thesis, Cambridge University]. British Library EThOS.

Brinton, L., & Traugott, E. (2005). *Lexicalization and language change.* Cambridge University Press.

Caha, P. (2009). *The nanosyntax of case.* [Doctoral thesis, University of Trømso]. http://www.ub.uit.no/munin/bitstream/10037/2203/1/thesis.pdf.

Cinque, G., & Rizzi, L. (Eds.). (2010). *The cartography of syntactic structures*, vol. 6. Oxford University Press.

Comrie, B. (1985). *Tense.* Cambridge University Press.

Croft, W. (2003). *Typology and universals*, 2nd ed. Cambridge University Press.

Croft, W. (2012). *Verbs: Aspect and causal structure.* Oxford University Press.

Croft, W., & Poole, K. T. (2008). Inferring universals from grammatical variation: Multidimensional scaling for typological analysis. *Theoretical Linguistics*, *34*(1), 1–37.

Cruse, A. (1986). *Lexical semantics.* Cambridge University Press.

Cruse, A. (2004). *Meaning in language: An introduction to semantics and pragmatics.* Cambridge University Press.

Cysouw, M. (2010). Semantic maps as metrics on meanings. *Linguistic Discovery*, *8*(1), 70–95.

Damico, J., & Tetnowski, J. (2014). Triangulation. In C. J. Forsyth & H. Copes (Eds.), *Encyclopedia of social deviance* (pp. 709–721). Sage publications.

De Mauro, T. (2020). *Il dizionario della lingua Italiana* [The Italian language dictionary]. Paravia Editrice.

Deignan, A. (2005). *Metaphor and corpus linguistics.* John Benjamins.

Deignan, A. (2014). Metaphorical polysemy and paradigmatic relations: A corpus study. *Word*, *50*(3), 319–338.

den Dikken, M. (2018). Adpositions and case: Alternative realisation and concord. *Finno-Ugric Languages and Linguistics*, *7*(2), 39–75.

Desagulier, G. (2022). Changes in the midst of a construction network: A diachronic construction grammar approach to complex prepositions denoting internal location. *Cognitive Linguistics*, *33*(2), 339–386.

Dölling, J. (2020). Systematic polysemy. In D. Gutzmann, L. Matthewson, C. Meier, H. Rullmann & T. E. Zimmermann (Eds.), *The wiley lackwell companion to semantics* (pp. 40–60). Wiley Press.

Evans, V. (2009). Semantic representation in LCCM theory. In V. Evans & S. Pourcel (Eds.), *New directions in cognitive linguistics* (pp. 50–80). John Benjamins.

Evans, V. (2010). From the spatial to the non-spatial: The 'state' lexical concepts of *in*, *on* and *at*. In V. Evans & C. Paul (Eds.), *Language, cognition and space: The state of the art and new directions* (pp. 215–248). Equinox.

Evans, V. (2015). A unified account of polysemy within LCCM theory. *Lingua*, *152*(6), 201–224.

Evans, V. (2019). *Cognitive linguistics: A complete guide.* Edinburgh University Press.

Falkum, I. L. (2015). The 'how' and 'why' of polysemy: A pragmatic account. *Lingua*, *157*(1), 83–99.

Fauconnier, G., & Turner, M. (2003). Conceptual blending, form and meaning. *Recherches En Communication*, *19*(1), 58–86.

Fillmore, C. J. (1982). Frame semantics. In the Linguistic Society of Korea (Ed.), *Linguistics in the morning calm* (pp. 111–137). Hanshin Publishing.

Fillmore, C. J. (2006). Frame semantics. In K. Brown (Ed.), Encyclopaedia of language and linguistics, 2nd ed (pp. 613–620). Elsevier.

Fillmore, C. J., & Baker, C. (2012). A frames approach to semantic analysis. In B. Heine & H. Narrog (Eds.), *The oxford handbook of linguistic analysis* (pp. 313–340). Oxford University Press.

Franco, L. (2016). Axial parts, phi-features and degrammaticalization: The case of Italian presso/pressi in diachrony. *Transactions of the Philological Society*, *114*(2), 149–170.

Franco, L. (2020). (Im)proper prepositions in (Old and Modern) Italian. In L. Franco & P. Lorusso (Eds.), *Linguistic variation: Structure and interpretation* (pp. 249–272). Mouton De Gruyter.

Franco, L., Manzini, M.R., & Savoia, L. M. (2021). Locative Ps as general relators: Location, direction, DOM in Romance. *Linguistic Variation*, *21*(1), 135–173.

Folli, R. (2002). *Constructing telicity in English and Italian*. [Doctoral thesis, University of Oxford]. http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.395298.

Folli, R. (2008). Complex PPs in Italian. In A. Asbury, J. Dotlačil, B. Gehrke & R. Nouwen (Eds.), *Syntax and semantics of spatial P* (pp. 197–220). John Benjamins.

Gabrielli, A. (Ed.). (2020). *Grande dizionario della lingua Italiana* [Great dictionary of the Italian language]. Mondadori.

Ganfi, V., & Piunno, V. (2017). Preposizioni complesse in italiano antico e contemporaneo: Grammaticalizzazione, schematismo e produttività [Complex prepositions in ancient and contemporary Italian: Grammar, schematism and productivity]. *Archivio Glottologico Italiano*, *CII*(2), 184–204.

Garzonio, J., & Rossi S. (2016). Case in Italian complex PPs. In E. Carrilho, A. Fiéis, M. Lobo & S. Pereira (Eds.), *Romance languages and linguistic theory 10: Selected papers from 'Going Romance' 28, Lisbon* (pp. 121–138). John Benjamins.

Gentner, D., & Wolff, P. (2000). Metaphor and knowledge change. In E. Dietrich & A. Markman (Eds.), *Cognitive dynamics: Conceptual change in humans and machines* (pp. 295–342). MIT Press.

Georgakopoulos, T., & Polis, S. (2018). The semantic map model: State of the art and future avenues for linguistic research. *Language and Linguistics Compass*, *12*(9), 1–33.

Georgakopoulos, T., & Polis, S. (2021). Lexical diachronic semantic maps: Mapping the evolution of time-related lexemes. *Journal of Historical Linguistics*, *11*(3), 367–420.

Georgakopoulos, T., & Polis, S. (2022). New avenues and challenges in semantic map research (with a case study in the semantic field of emotions). *Zeitschrift für Sprachwissenschaft*, *41*(1), 1–30.

Giuliani, M. (2013). Una struttura semantica per da (con spunti per la redazione delle preposizioni nel TLIO) [A semantic structure for *da* (with ideas for drafting prepositions in TLIO)]. In P. Larson, P. Squillacioti & G. Vaccaro (Eds.), *L'Opera del vocabolario Italiano per Pietro G. Beltrami* [The Work of Italian Vocabulary for Pietro G. Beltrami] (pp. 107–118). Edizioni dell'Orso.

Grady, J. (1997). Theories are buildings revisited. *Cognitive Linguistics*, *4*(4), 267–290.

Grossman, E., & Polis, S. (2017). Polysemy networks in language contact: The borrowing of the Greek-origin preposition κατά/κατα in Coptic. In E. Grossman, P. Dils, T. S. Richter & W. Schenkel (Eds.), *Greek influence on Egyptian-Coptic: Contact-induced change in an ancient African language* (pp. 335–367). Widmaier Verlag.

Group, P. (2007). MIP: A method for identifying metaphorically used words in discourse. *Metaphor and Symbol*, *22*(1), 1–39.

Hagège, C. (2010). *Adpositions*. Oxford University Press.

Hale, K., & Keyser, S. J. (2002). *Prolegomena to a theory of argument structure*. The MIT Press.

Haspelmath, M. (1997). *From space to time: Temporal adverbials in the world's languages*. LINCOM Europa.

Haspelmath, M. (2003). The geometry of grammatical meaning: Semantic maps and crosslinguistic comparison. In M. Tomasello (Ed.), *The new psychology of language: Cognitive and functional approaches to language structure*, vol. 2 (pp. 211–242). Laurence Erlbaum.

Hoelbeek, T. (2015). À travers de? A diachronic analysis of French à/au travers in combination with the preposition de. *Neuphilologische Mitteilungen*, *116*(1), 55–84.

Hoelbeek, T. (2017). *The evolution of complex spatial expressions within the Romance family: A corpus-based study of French and Italian*. Brill.

Jackendoff, R. (1983). *Semantics and cognition*. The MIT Press.

Jackendoff, R. (1992). *Semantic structures*. The MIT Press.

Jezek, E. (2016). *The lexicon: An introduction*. Oxford University Press.

Kearns, K. (2006). Lexical semantics. In B. Aarts & A. McMahon (Eds.), *Handbook of English linguistics* (pp. 557–580). Blackwell.

Lakoff, G. (1987). Women, fire, and dangerous things: What categories reveal about the mind. University of Chicago Press.

Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and thought*, 2nd ed (pp. 390–437)*. Cambridge University Press.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.

Lakoff, G. & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought.* Basic Books.

Langacker, R. (1987). *Foundations of cognitive grammar*, vol. 1. Stanford University Press.

Langacker, R. (1991). *Foundations of cognitive grammar*, vol. 2. Stanford University Press.

Langacker, R. (2008). *Cognitive grammar: A basic introduction*. Oxford University Press.

Levinson, S. C., & Meira, S. (2003). Natural concepts in the spatial topological domain-adpositional meanings in crosslinguistic perspective: An exercise in semantic typology, *Language*, *79*(3), 485–516.

Luraghi, S. (2009). A model for representing polysemy: The Italian preposition *da*. In J. François, É. Gilbert, C. Guimier & M. *Krause* (Eds.), *Autour de la préposition: Actes du colloque international de Caen* [On prepositions: Collected papers of the Caen international symposium] (pp. 76–90). Presses Universitaires de Caen.

Luraghi, S. (2011). The coding of spatial relations with human landmarks. In S. Kittilä, K. Västi & J. Ylikoski (Eds.), *Case, animacy and semantic roles* (pp. 209–234). John Benjamins.

Lyding, V., Stemle, E., Borghetti, C., Brunello, M., … & Pirrelli, V. (2014). The PAISÀ Corpus of Italian Web Texts. In F. Bildhauer & R. Schäfer (Eds.), *Proceedings of the 9th Web as Corpus Workshop* (pp. 36-43). Association for Computational Linguistics.

Murphy, L. M. (2010). *Lexical meaning*. Cambridge University Press.

Nida, E. A. (1975). *Componential analysis of meaning: An introduction to semantic structures.* Mouton.

Piunno, V., & Ganfi, V. (2019). Usage-based account of Italian complex prepositions denoting the agent. *Revue Romane*, *54*(1), 141–175.

Piunno, V., & Ganfi, V. (2020). Synchronic and diachronic analysis of prepositional multiword modifiers across Romance languages. Lingvisticæ Investigationes, *43*(2), 352–379.

Pustejovsky, J. (1995). *The generative lexicon*. The MIT Press.

Regier, T., Khetarpal, N., & Majid, A. (2013). Inferring semantic maps. *Linguistic Typology*, *171*(1), 169–194.

Reijnierse, W. G., Burgers, C., Krennmayr, T., & Steen, G. J. (2018). DMIP: A method for identifying potentially deliberate metaphor in language use. *Corpus Pragmatics*, 2, 129–147.

Riemer, N. (2005).*The semantics of polysemy: Reading meaning in English and Warlpiri*. Mouton de Gruyter.

Rizzi, L. (1988). Il sintagma preposizionale [The prepositional syntax]. In L. Renzi, G. P. Salvi & A. Cardinaletti (Eds.), *Grande grammatica italiana di consultazione* [Great Italian grammar of consultation] (pp. 507–531). Il Mulino.

Romeu, J. F. (2014). *Cartografía minima de las preposiciones espaciales* [The minimum mapping of spatial prepositions]. [Doctoral thesis, Universidad Complutense de Madrid]. https://hdl.handle.net/20.500.14352/38441.

Rothbauer, P. M. (2008). Triangulation. In L. M. Given (Ed.), *The SAGE encyclopaedia of qualitative research methods* (pp. 892–894). Sage Publications.

Ruhl, C. (1989). *On monosemy: A study in linguistic semantics*. State University of New York Press.

Salvi, G., & Vanelli, L. (2004). *Nuova grammatica italiana* [New Italian grammar]. Il Mulino.

Steen, G. (2011). The contemporary theory of metaphor – now new and improved! *Review of Cognitive Linguistics*, *9*(1), 26–64.

Stosic, D. (2007). The Prepositions "par" and "à travers" and the categorization of spatial entities in French. In M. Aurnague, M. Hickmann & L. Vieu (Eds.), *The categorization of spatial entities in language and cognition* (pp. 71–91). John Benjamins.

Svenonius, P. (2006). The emergence of axial parts. *Nordlyd: Tromsø working papers in linguistics*, *33*(1), 49–77.

Svenonius, P. (2008). Projections of P. In A. Asbury, J. Dotlačil, B. Gehrke & R. Nouwen (Eds.), *Syntax and semantics of spatial P* (pp. 63–84). John Benjamins.

Svenonius, P. (2010). Spatial P in English. In G. Cinque & L. Rizzi (Eds.), *The cartography of syntactic structures*, vol. 6 (pp. 127–160). Oxford University Press.

Talmy, L. (2000). *Towards a cognitive semantics*. The MIT Press.

Taylor, J. (1988). Contrasting prepositional categories: English and Italian. In B. Rudzka-Osty (Ed.), *Topics in cognitive linguistics* (pp. 299–326). John Benjamins.

Tortora, C. (2005). The preposition's preposition in Italian: Evidence for boundedness of space. In R. Gess & E. J. Rubin (Eds.), *Theoretical and experimental approaches to Romance linguistics* (pp. 307–327). John Benjamins.

Tortora, C. (2008). Aspect inside place PPs. In A. Asbury, J. Dotlačil, B. Gehrke & R. Nouwen (Eds.), *Syntax and semantics of spatial P* (pp. 273–301). John Benjamins.

Ursini, F.-A. (2015). On the Syntax and Semantics of Italian Spatial Ps. *Acta Linguistica Hungarica*, *63*(1), 63–110.

Ursini, F.-A. (2017). The Polysemy of Italian Spatial Ps. In R. D'Alessandro, G. Iannaccaro & D. Passino (Eds.), *A Festscrhift for Maria Grossmann* (pp. 349–369). Brill.

Ursini, F.-A. (2020). General location across languages: On the division of labour between functional and lexical items in spatial categories. *The Linguistic Review*, *37*(4), 495–542.

Ursini, F.-A., & Giannella, A. (2016). The Polysemy of Spatial Ps: The case of Spanish. *Borealis. An International Journal about Hispanic linguistics*, *5*(2), 90–150.

Ursini, F.-A., & Long, H. (2021). Polysemy and Semantic Relations in Aquilan Prepositions. *Onomazaéin, 54*, 203–223.

Ursini, F.-A., Long, H., & Zhang, Y. (2022). Polysemy and Semantic Relations in Italian Spatial Prepositions: From Data to Theory. *Revista Signos*, *55/108*(3), 173–198.

Ursini, F.-A., Tse, K., & Wu, T. (2023). Extending the Semantic Cartography Hypothesis Beyond French Spatial Prepositions. In D. Stosic, M. Bras, C. Minoccheri & O. Abrard (Eds.), *Les prépositions complexes en français: théories, descriptions, applications* [Complex prepositions in French: theory, description, and application] (pp. 119–133). L'Harmattan.

Tyler, A., & Evans, V. (2003). *The semantics of English prepositions: Spatial scenes, embodied meaning, and cognition*. Cambridge University Press.

Vicente, A., & Falkum, I. L. (2017). Polysemy. In M. Aronoff (Ed.), *Oxford research encyclopaedia of linguistics online*. https://doi.org/10.1093/acrefore/9780199384655.013.325.

Waliński, J. T. (2018). *Verbs in fictive motion*. University of Lodz Press.

Wolff, P., & Gentner, D. (2000). Evidence for role-neutral initial processing of metaphors. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *26*, 529–541.

Wolff, P., & Gentner, D. (2011). Structure mapping in metaphor comprehension. *Cognitive Science*, *3512*, 1456–1488.

Zingarelli, N. (2022). *Lo Zingarelli: Vocabolario della lingua italiana* [The Zingarelli vocabulary of the Italian language]. French & European Pubns.

Zwarts, J. (2008). Aspects of a typology of direction. In S. D. Rothstein (Ed.), Theoretical and crosslinguistic approaches to the semantics of aspect (pp. 179–230). John Benjamins.

Zwarts, J. (2010). Semantic map geometry: Two approaches. *Linguistic Discovery*, *8*(1), 377–395.