Cognitive Modeling in Computational Rhetoric: Litotes, Containment and the Unexcluded Middle

Jelena Mitrović[1][a], Cliff O'Reilly[2][b], Randy Allen Harris[3][c] and Michael Granitzer[1][d]
[1]*Faculty of Computer Science and Mathematics, University of Passau, Germany*
[2]*Birkbeck College, University of London, U.K.*
[3]*Department of English Language and Literature, University of Waterloo, Canada, U.S.A.*

Keywords: Litotes, Computational Rhetoric, Cognitive Modeling, Ontology, Image Schema, Unexcluded Middle.

Abstract: The focus of our study is the rhetorical figure litotes and its cognitive modeling. This figure is formed by a contrary term that emphatically accentuates a positive, e.g. *He is not exactly an idiot* (said of Albert Einstein). Lawrence Horn's illumination of the Law of Excluded Middle and its relationship to litotes by creating an Unexcluded Middle is central to our ideas and we correlate this to Image Schema theories developed by Mark Johnson, George Lakoff and Rafael Núñez – specifically the schema of CONTAINMENT. The distinction between contrary and contradictory opposition is described. We extend the assessment of the Excluded Middle from the perspective of Image Schema theory into the realm of the Unexcluded Middle and draw a representation of the layout of containers and analogous concept-activation. Lastly, we create and present an OWL ontology and publish it online.

1 INTRODUCTION

We argue for the integration of rhetorical studies, cognitive science, computational modeling, and Natural language processing (NLP), by way of an extended example, the unjustly neglected rhetorical figure, litotes.

Litotes is a figure in which we say less but mean more ("minus dicimus et plus significamus" (Miguel, 1990)) and can be placed in the Pragmatic context under Implicature – the difference between what is *said* by a speaker and what is *intended*[1]. Litotes is as ubiquitous as any of the more famous rhetorical figures such as metaphor and irony, and yet not well studied from a computational perspective. Despite this neglect, we hold that research on its function, role and importance promises headway in the rich new field of figure analysis in Computational Rhetoric, an area of study which brings together computer scientists, rhetoricians, psychologists, philologists, literary critics and information scientists working on the detection and understanding of rhetorical figures, their associated cognitive machinery and computational applicability.

In this paper we connect the realm of rhetorical studies to the domain of Image Schema theory. As Dewell has said: "...language plays a much greater role in the development of image schemas than is often assumed, contributing not only to cross-linguistic variation but also to some universal similarities in the structure of image schemas" (Dewell, 2005). We are especially concerned with the universal schema known as *containment*, which gives a valuable purchase on litotes.

The Law of the Excluded Middle is a primary element of logical thought and a variant extension of this law – named the Unexcluded Middle – effectively bridges litotic understatement and cognitive concept-activation, i.e. the neuronal activity resulting in conscious or subconscious *understanding* of a concept.

In section 2 we offer some background on litotes, a more detailed analysis of the Unexcluded Middle, the Image Schema CONTAINMENT and the ontological approach to modeling litotes. Section 3 gives an analysis of how these concepts are intertwined in litotes while in section 4 we provide an OWL ontology of litotes. Conclusions and Future work considerations are given in the last two sections of the paper.

[a] https://orcid.org/0000-0003-3220-8749
[b] https://orcid.org/0000-0001-8002-5336
[c] https://orcid.org/0000-0002-9324-1879
[d] https://orcid.org/0000-0003-3566-5507

[1]For a defining overview of rhetorical figures including litotes see (Harris and Di Marco, 2017)

Mitrović, J., O'Reilly, C., Harris, R. and Granitzer, M.
Cognitive Modeling in Computational Rhetoric: Litotes, Containment and the Unexcluded Middle.
DOI: 10.5220/0009104908060813
In *Proceedings of the 12th International Conference on Agents and Artificial Intelligence (ICAART 2020) - Volume 2*, pages 806-813
ISBN: 978-989-758-395-7; ISSN: 2184-433X

2 BACKGROUND

2.1 Litotes

Litotes is a rhetorical figure in which a statement is made emphatic by denying a contrary. A straightforward example from Henry Peacham's *The Garden of Eloquence* (1593) is "he is not the wisest man in the world" which has a meaning similar to "he is a fool" (Lanham, 1991). It is a form of understatement, also known as Deminutio to Latin pre-Christian scholars, but the term comes to us from the Greek meaning "smooth" or "plain": λιτοτης. An example of litotes appears in the early handbook erroneously attributed to Cicero, the *Rhetoric ad Herennium* (Cicero, 1954):

> "his father left him a patrimony that was – I do not wish to exaggerate – not the smallest"

Cicero expresses the point of mitigating a positive but nevertheless getting across the message intended, i.e. that the legacy in question was large indeed. There is, in short, some level of irony at work with litotes, and interpretation requires a reconstruction of the speaker's intention. The impact of litotes derives from speaking plainly about a subject while, at the same time, contradicting a negative term to enhance the positive. Its usefulness as a means for understatement, modesty and insult leads to significant usage and an almost ubiquitous position in language and culture (Shovel, 2015). Its prominence has brought a few interesting studies in more recent times (Hermann et al., 2013; Yuan, 2017)

Horn examines the figure in great detail (Horn, 2017) and differentiates between two important concepts - contrariety and contradiction. A contradictory opposition is binary, e.g. *black* versus *white* or *green* versus *not green*, whereas a contrary opposition can allow room for things to lie in-between, e.g. *truthful* versus *untruthful* or *comfortable* versus *uncomfortable*. Nuance, context and vagueness are important factors that determine the impact of the differences in contrary oppositions.

Litotes aligns both with the principles of logic (the negation of a negative is a positive) and the principles of style (no repetition is null). Repetitions work chiefly in an additive way, but the main is additive, familiar in the iconicity principle of quantity – more language corresponds to more conceptual matter (Givon, 1991). That is where the emphasis comes in. The two negatives in this case are not just positive, they are emphatically positive. Denotatively, "not the smallest" means that there is at least one other quantity that is smaller, the *not* cancelling out the superlative. Rhetorically, it means something more like "the biggest", or at least "really big". Sometimes, however, repeating the negative has less emphatic sense. For instance, compare the two sentences, "Lupita Nyong'o is not unattractive" (with a negator and a negating prefix) and "Lupita Nyong'o is not ugly" (with a negator and a negatively valenced adjective). The first one is mildly complimentary about her appearance, the second more emphatic. And with the following example, which pushes the disavowal of the adjective to an extreme, the compliment approaches perfection: "Lupita Nyong'o is the furthest thing from ugly."

Computational modeling of litotes has to take into consideration its many characteristics, negation being the most prominent. Negation has been treated differently in Linguistics and Rhetoric, as well as in Pragmatics, where it has a strong effect (Taboada et al., 2017). Likewise, a rhetorical figure such as Antithesis has been seen as very effective and even persuasive, precisely due to the presence of negation, as well as opposition. We see litotes as a figure that can also play a persuasive role in arguments, therefore its detection should be included in argument mining systems (Mitrović et al., 2017).

2.2 Unexcluded Middle

In logic, the Law of Excluded Middle, dating at least to Aristotle's discussion of the principle of non-contradiction in *On Interpretation* (Aristotle, 1938), states that for any proposition, either that proposition is true or its negation is true. It is the third of the three classic laws of thought. This, now (in)famous quote from a former United States' president illustrates usage of the excluded middle in modern practice :

> (1) *Either you are with us or you are with the terrorists* (George W. Bush)

Using propositional logic notation to reflect the logic of the terms and arguments involved we can say that $P \vee Q$ becomes $P \vee \neg P$ (P represents being "with us" and Q represents being "with the terrorists"). By implication anyone not with "us" must be with "the terrorists". We illustrate this in Figure 1 – we transition from a three member set {us,terrorists,neither us nor terrorists} to a two-member set {us,terrorists} and the middle is effectively excluded from being (*"polar contraries* p *and* q *become mutually exhaustive as well as mutually inconsistent"* (Horn, 2017)).

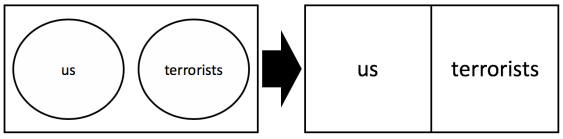

Figure 1: Transition to Excluded Middle.

There is a further twist to this pattern called the *Unexcluded Middle*. This aspect of the litotic form can be seen in the following example:

(2) *I'm not happy but I'm not unhappy about it.* (The History Boys, Alan Bennett)

The speaker is neither happy nor unhappy which violates the law of non-contradiction, but rhetorically the meaning is that happiness is irrelevant to the situation. Pragmatically, we may also say that (despite the binary nature of the adjectives) happiness can form a contrary opposition, not contradictory one, so that the speaker can be seen to articulate a midpoint on a continuum, neither positive (happy) nor negative (unhappy), the negator and the negative affix cancelling each other out. Figure 2 shows a representation of the Unexcluded Middle and the creation of a new state that is in-between happy and not happy. We could graphically represent this in a number of ways, but choose this three-member set for simplicity.

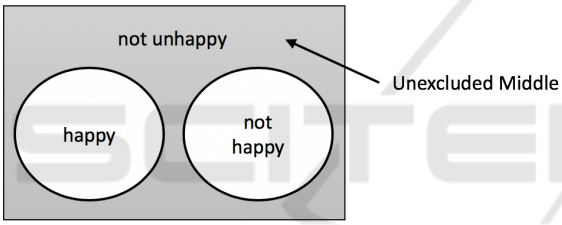

Figure 2: Representation of the Unexcluded Middle.

Reinhard Blutner describes this phenomenon as *"double negation"* and draws it slightly differently (Figure 3) (Blutner et al., 2004). Blutner also reflects that "it's an interesting exercise to introduce more than three states of happiness...More importantly, in the context of litotes, it seems necessary to account for the effect of gradient acceptability and continuous scales" (Blutner et al., 2004).

Horn states that "To depict individuals (or their marriages and routines) as 'not unhappy' yet – by implication – not (exactly) happy either is to tacitly invoke a scale *<not unhappy, happy>* in accordance with which a weaker property is affirmed or conceded but a stronger alternative implicitly denied" (Horn, 2017). The key term for us here is "by implication" since it is the mental process of blending knowledge about what happiness in marriage is like which can give rise to opposition. What is implied by understanding of words, contexts, stereotypes, Scripts (Schank and Abelson, 1975), Frames (Fillmore et al., 1982) etc. affects what happens in the balancing of terms.

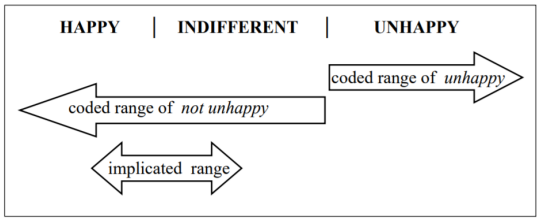

Figure 3: When two negatives don't make a positive, reproduced from (Blutner et al., 2004).

Just as regarding affixal negation (the "notorious not un- construction" (Horn, 2017)) such as "not unhappy", we can include a similar description of a term that creates a contradictory opposition. In the example phrase, below, by Roger Penrose, the Unexcluded Middle is created between the possible and impossible.

(3) *Quantum entanglement is a very intriguing issue, but it is not impossible.* (Roger Penrose)

Possibility should not be able to be defined in this way (Frege's assertion that *"clothing a thought in double negation does not alter its truth value"* (Frege and Beaney, 1997) should hold true for propositional logic), however this example shows another Unexcluded Middle where understanding the subject (Quantum Entanglement) is in some way neither possible nor impossible. This case could be for the purposes of understatement or simply a play on the concept of impossibility given that the perceived difficulty of understanding Quantum Theory is well known. Horn's analysis defines a symbolic representation for this phenomenon:

1. $\neg(©[_{adj}X])$
2. $\neg(\neg[_{adj}X])$

(© represents contrary opposition, ¬ represents contradictory opposition and $[_{adj}X]$ represents an adjectival term.)

2.3 Image Schemata

Image Schemata are "structures by which we are able to have coherent experience that we can comprehend" (Johnson, 1987), but "they can be seen as the conceptual building blocks for metaphoric and abstract thought" (Hedblom et al., 2015). Image Schemata provide a framework which we can use to describe complex structures of understanding and cognition in many domains. We focus herein on the linguistic, but also take into account that the underlying mechanisms are neurological, develop from infancy and are sensori-motor in origin (Cuccio and Gallese, 2018).

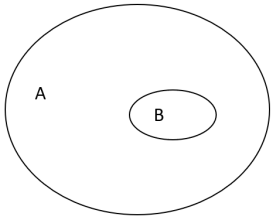

Figure 4: Venn-style diagram representing CONTAINER objects.

2.3.1 The Schema CONTAINMENT

There are many recognized Image Schemata, one fundamental example being CONTAINMENT. Johnson discusses the structure of this schema. Based on experience of the world (grounded or embodied), a recurring organization of structure, spatially bounded, a three-dimensional container is experientially salient and can be thought of as an *"in-out orientation"* (Johnson, 1987).

Lakoff and Núñez approach core concepts in mathematics from the direction of Image Schema theory (Lakoff and Núñez, 2000). Of particular interest to us is the treatment of CONTAINMENT mapped to fundamental inferential laws of logic and especially the Law of Excluded Middle. Also the link established between visual processing in the brain (a root for Image Schema theory) and concept-activation applied to non-visual stimuli, gives us a basis for the arguments in this paper and therefore a thesis that the underlying mechanisms of language understanding – especially the complex and rich domain of rhetoric – are predicated on the same brain structures (or at least connected to them) that give rise to visual processing and conceptualizations; *"...it makes neurological sense that structures in the visual system can be used for conceptual purposes"* (Lakoff and Núñez, 2000). As argued further in their work, the capacity for perceiving the world in terms of contained structures gives rise to a sort of *Folk Boolean Logic* which can be associated to a Venn diagram, such as in Figure 4. Container A represents a concept. Object B is within the container and therefore adheres to the concept of A.

Each region in the diagram is related to a concept that maps to a Container element (either in or out of the container). Lakoff and Núñez develop a *Law of Container Schemas* which evolves from the mapping of structural constraints (from the physical process of containment and exclusion) to inferential structures which are conceptual in nature, but follow analogous "rules", e.g. *an object inside a container* maps to *a member of the category represented by the container*. This gives rise to the Conceptual Metaphor *Categories Are Containers*. Table 1 shows the progression through logic from the CONTAINER schema to a symbolic representation of the Law of Excluded Middle.

2.4 Ontological Approach

Ontologies are ideal for representing ideas as complex as rhetorical figures, which have specific properties and are often interrelated (Harris et al., 2017). The figure of Anadiplosis, for example, has the property of repeating lexemes across clause boundaries and litotes, as we have seen, is centred on specific phrases (lexemes) in well-defined orientations (double-negation). Furthermore, rhetorical figures have a tendency to co-occur which makes linking concepts within and across distinct ontology models a useful tool for extending understanding and also for inferential knowledge discovery.

Our ontology of litotes is modeled and developed in OWL [2] which enables us to utilize the power of logical inference and validation with tools such as Protege [3]. It also enables significant re-use within the Semantic Web movement since, by publishing the ontology files online, we enable others to benefit from our work. We create links via OWL properties to ontologies already part of the Semantic Web and this potentially allows inference and computation across the combined set of data we hope to create in the near future.

There are numerous recent works that develop an ontological perspective on image schemata (Kimmel, 2005; Kuhn, 2007; Hedblom et al., 2014; Hedblom et al., 2018), however, to our knowledge, few OWL ontologies exist that describe the cognitive aspects of rhetorical figure sub-structure (a number of taxonomically-focussed ontologies have been developed however, e.g. the Ontology of Rhetorical figures for Serbian (Mladenović and Mitrović, 2013) and the Ontology focusing on the figure Antimetabole (O'Reilly and Harris, 2017).

3 ANALYSIS

Similar to Bennett & Cialone's analysis of geometrical constraints through their "Eight kinds of surrounding" (Bennett and Cialone, 2014) we explore the Venn-style representation of the container/concept analogy. Lakoff and Núñez represent the Container Schema logic for Excluded Middle as a container with

[2] https://www.w3.org/OWL/
[3] https://protege.stanford.edu/

Table 1: Logic and Law progression for Excluded Middle (from (Lakoff and Núñez, 2000).

Logic	Law
Embodied Container Schemata	*Every object X is either in Container schema A or out of Container schema A*
Mapped classes	*Every entity X is either in category A or out of category A*
Propositions mapped from classes	*Every proposition P is either true or not true*
Symbolic form mapped from propositions	$P \vee \neg P$

an entity X either in or out of the container A – Figure 5.

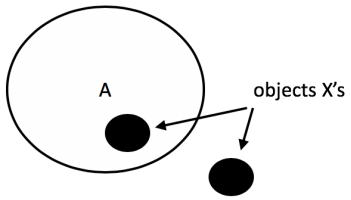

Figure 5: Container Schema representation for Excluded Middle, reproduced from (Lakoff and Núñez, 2000).

To follow our previous example of an utterance credited to the former US President Bush, we might say that the container A represents the category *terrorist* and for entity X to be positioned in the container is *to be a terrorist* and outside the container is to belong to *us* as presented in the infamous quote given in Section 2.2 of this paper.

In considering the Unexcluded Middle we extend this analogy and diagramming method. Figure 6 shows a view of container and entity orientation in respect to the Unexcluded Middle. To follow the example from Penrose again, an opposition is created between possible and impossible, but because the *"semantic contradictory is also a virtual (or coerced) contrary"* (Horn, 2017) we have to consider three categories and therefore three containers.

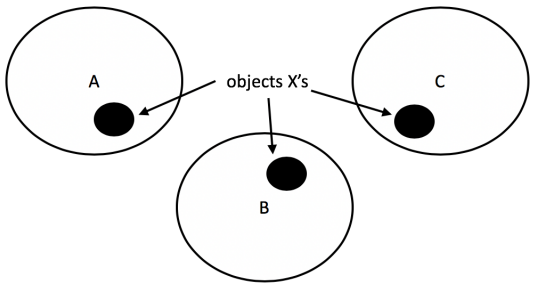

Figure 6: Container Schema representation #1 for Unexcluded Middle.

The process of double negation similar to those described herein leads to concept-activation (again, we are not referring exclusively to the creation of a novel concept representation) and a conceptual leap that results in added complexity and ambiguity. Container A could be *possible*, container B *impossible* and container C could represent *not impossible* (the so-called Unexcluded Middle). The entity X is either in container A, B or C.

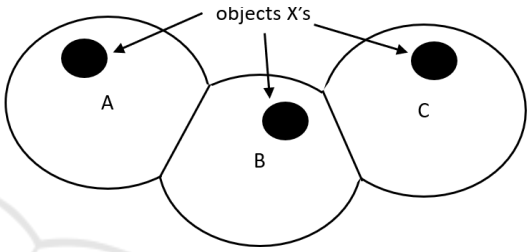

Figure 7: Container Schema representation #2 for Unexcluded Middle.

We contend that in reality it is plausible that some form of all three concepts (containers) are activated especially where concepts are not completely contrary or if there is a particularly large contextual overlap. We show this alternative representation in Figure 7. The key difference between Figures 6 and 7 is that the containers are merged or in contact (Johnson lists MERGING and CONTACT as separate image schemata (Johnson, 1987) which indicates some overlap or connection between the concepts.

4 ONTOLOGY

We take the previous insights gained from coalescing the image schema of CONTAINMENT, our understanding of linguistic entities, and the concept-activation process we have termed the Unexcluded Middle and develop an OWL ontology representation. We draw a graph showing the main concepts and relations and display it in the Figure 8.

We describe the linguistic entity *Lexeme* which may be *proximal-to* any other lexeme and each of which may *evoke* a *Sememe*. The sememe being a semantic unit and lexeme being a lexical unit – these terms reflect linguistic standards. A sememe can be *situated-in* either an *Exterior* or *Interior* of a *Container* which itself is *bounded-by* a *Boundary*. In-

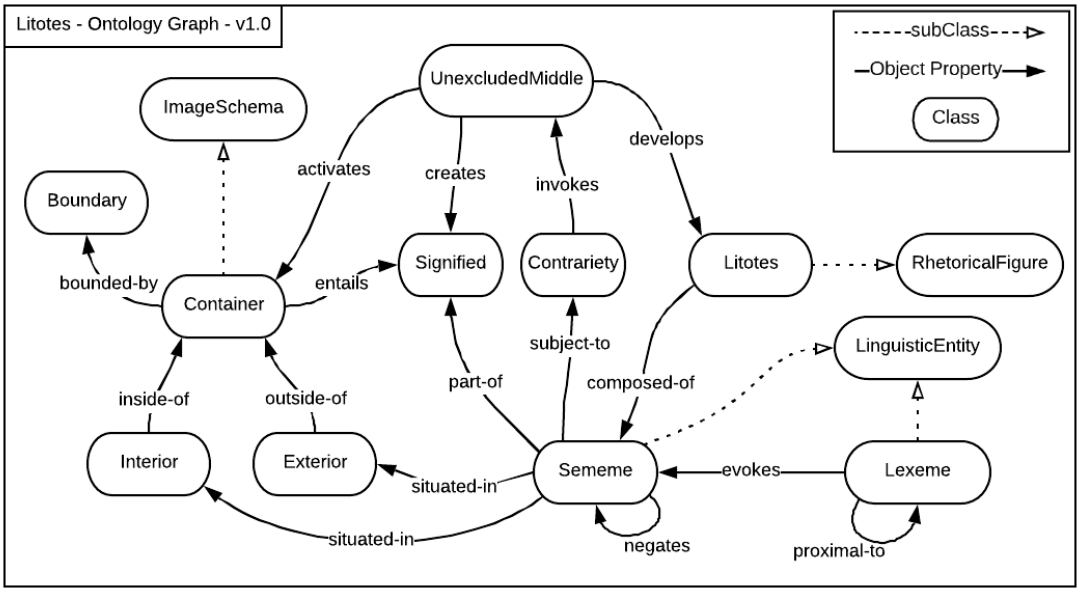

Figure 8: Ontology of the rhetorical figure litotes.

stances of the class of **litotes** are *composed-of* instances of *Sememe* which themselves are *part-of* the class of *Signified*. Signified is a linguistic term and represents the set of concepts (in semantic terms, sememes) that are evoked by lexical units. Tying together the container, signified and litotes entities is the *UnexcludedMiddle* class. We argue that this entity *activates* a container (through a neurological process not understood well and not described herein) and the specific order or direction of this relationship is debatable.

From image schema theory we say that a container entails the concept (signified). This is a metaphoric action, i.e. signifieds are not actually *in* anything (except, debatably, *in* our heads), but since we grasp embodied experience intuitively we can use our physical and spatial understanding of the world to set concepts in metaphoric bounded containers. Due to the synchrony between containers and signifieds, the unexcluded middle class *creates* a signified and, further, it is the unexcluded middle that *develops* the existence of the figure of litotes.

Lastly, we contend that the Unexcluded Middle is itself invoked by the *Contrariety* that exists between sememes (Sememes are *subject-to* Contrariety). There is further work in this area that should involve the other invoking mechanisms around the Unexcluded Middle such as the context or knowledge of the thinker.

The ontology is deliberately underspecified which allows for more flexibility in the descriptions we provide. We have yet to apply this model to many examples of real-world figures of litotes, however because we are modelling at a high level and underspecifying properties we do not believe this is a problem to be fixed. We do, however, anticipate that future work would include greater specificity and the use of this ontology in computational applications.

We publish our OWL representation (in XML format) online [4].

5 CONCLUSION

In this paper we argue that litotes is a rhetorical figure that develops a novel middle ground located between an opposition of terms. The middle ground can be described in concept-activation terms and can be considered in the light of Image Schema theory – especially the schema of CONTAINMENT. This contrasts with the logical view of the Law of the Excluded Middle where concepts are definitively bounded. Still, there is a more complex conceptual arrangement involved where litotes is used and we show a model for the activation of new concepts (and Containers) to account for this novel middle ground(s).

To make this point clearer we must show various strengths of the figure – that are reflected in the relative strengths of Implicature. Two further examples are given, below.

> (4) *"Not a bad day's work on the whole," he muttered, as he quietly took off his mask, and his pale, fox-like eyes glittered in the red glow of the fire. "Not a bad day's work."*

[4] http://repositori.com/sw/onto/litotes.owl

(Baroness Emmuska Orczy, The Scarlet Pimpernel, 1905)

(5) *Are you also aware, Mrs. Bueller, that Ferris does not have what we consider to be an exemplary attendance record?* (Jeffrey Jones as Principal Ed Rooney, Ferris Bueller's Day Off, 1986)

In (4) the intent is understatement (a good day's work is implied as having been done), but the phrase is a commonly-used one and usually reflects an alternative and modest way to congratulate someone. In (5), however, the implication here is that Ferris has a poor attendance record. It is an understatement again, but considering that we can picture the scene in the Principal's office with all of the context, we might believe that this second example is a stronger understatement and reflects more weight of intention to make an emphatic point about attendance, but without expressly uttering it.

In summary, litotes creates categorical structures which map to Containers, and therefore to neural structures – it is these that give rise to the ability for litotes to work at all. Furthermore, the balancing of negated terms versus a contrary – and therefore the construction of strong or weak opposites – defines the figure of litotes. This balancing force comes about through the context or wider semantics of the words in use. Therefore litotes gains strength by the use of terms with significant semantic baggage that allows the balancing forces to appear.

The power and ubiquity of litotes are evident to anyone giving modern language usage even just a brief analysis. This, coupled with the complexity of the meaning, makes it a very interesting and useful research area. For example in the modern world of all-pervading social media and a post-truth aspect, litotes is sometimes used to carry meaning that, due to its complexity, evades direct computational analysis. Notably we could look for its presence in hate-speech in a pejorative sense — which we could call *hidden hate-speech* — the speaker is not being hateful in a direct way, e.g. *He is not the smartest pea in the pod*.

Our research aims include highlighting the cognitive mechanisms which underlie the figure in order to attract greater interest and understanding. Through more awareness and comprehension we hope to encourage more research. A further motivation is to create computational models of the figure in order to drive automated discovery and analysis in a currently sparse field. Our ontological models are published online and usable by anyone wanting to perform logical inference across linguistic data sets. We are currently developing further computational models in this area.

6 FUTURE WORK

Much research has been done in the domain of Image Schema theory and cognitive understanding, however there is more to be done (*"The cognitive processes underlying concept invention are still largely unexplored ground"* (Hedblom et al., 2015)). The perspective from which we approach these issues is slightly different and we bring a wealth of rhetorical research behind us. The following are some areas that we believe will be important for future research in the cross-domain territory we are continuing to explore:

1. Our view is that the semantic and pragmatic *weight* of a word or phrase can impact the extent to which conceptual middles can be formed. We would like to follow this research direction through exploratory computational corpora analyses.
2. Taking into consideration the characteristics of litotes and its relation to negativity and Image Schemata, it is possible to build upon the ontological modeling of litotes as a rhetorical figure, as it was done in the RetFig project (Mladenović and Mitrović, 2013) and for the schema of BALANCE in (O'Reilly and Harris, 2017), and to further use this new model as a part of argument structure as envisioned in (Mitrović et al., 2017)
3. Many detailed studies of Image Schemata and especially CONTAINMENT have been done (Lakoff and Núñez, 2000; Dewell, 2005; Bennett and Cialone, 2014; Hedblom et al., 2018). We aim at research that would combine more of these deeper theories and alternative methods of understanding them with the linguistic domain along which we have already started.
4. Our ontological representation is deliberately underspecified which means the definitions are flexible. This can bring problems in terms of inference, but it can also make the ontology more pliable to mapping to well-developed upper ontologies such as SUMO (Niles and Pease, 2001) which would allow for inferencing on different levels of complexity. Our goal is to define in more detail the properties of the various entities we have modeled and to apply this to real-world examples within computer applications.

REFERENCES

Aristotle (1938). *On Interpretation*. Harvard University Press.

Bennett, B. and Cialone, C. (2014). Corpus guided sense cluster analysis: a methodology for ontology development (with examples from the spatial domain). In *FOIS*, pages 213–226.

Blutner, R. et al. (2004). Pragmatics and the lexicon. *Handbook of pragmatics*, 488-514.

Cicero, M. T. (1954). *Cicero Ad C. Herennium de ratione dicendi:(Rhetorica ad Herennium)*, volume 403. Harvard University Press.

Cuccio, V. and Gallese, V. (2018). A peircean account of concepts: grounding abstraction in phylogeny through a comparative neuroscientific perspective. *Phil. Trans. R. Soc. B*, 373(1752):20170128.

Dewell, R. (2005). Dynamic patterns of containment. *From perception to meaning: Image schemas in cognitive linguistics*, pages 369–393.

Fillmore, C. J. et al. (1982). Frame semantics. *Cognitive linguistics: Basic readings*, pages 373–400.

Frege, G. and Beaney, M. (1997). *The Frege Reader*. Blackwell Oxford.

Givon, T. (1991). Isomorphism in the grammatical code: Cognitive and biological considerations. *Studies in Language*, 15(1):85–114.

Harris, R., Di Marco, C., Mehlenbacher, A. R., Clapperton, R., Choi, I., Li, I., Ruan, S., and O'Reilly, C. (2017). A cognitive ontology of rhetorical figures. In *Proceedings of AISB Annual Convention 2017*, pages 228–235.

Harris, R. A. and Di Marco, C. (2017). Rhetorical figures, arguments, computation. *Argument & Computation*, 8(3):211–231.

Hedblom, M., Kutz, O., and Neuhaus, F. (2014). On the cognitive and logical role of image schemas in computational conceptual blending. CEUR-WS.org.

Hedblom, M. M., Gromann, D., and Kutz, O. (2018). I n, o ut and through: formalising some dynamic aspects of the image schema c ontainment. In *Proceedings of the 33rd Annual ACM Symposium on Applied Computing*, pages 918–925. ACM.

Hedblom, M. M., Kutz, O., and Neuhaus, F. (2015). Choosing the right path: image schema theory as a foundation for concept invention. *Journal of Artificial General Intelligence*, 6(1):21–54.

Hermann, K. M., Grefenstette, E., and Blunsom, P. (2013). "not bad" is not "bad": A distributional account of negation. *Proceedings of the ACL Workshop on Continuous Vector Space Models and their Compositionality*.

Horn, L. (2017). Lie-toe-tease: double negatives and unexcluded middles. *Philosophical Studies*, 174(1):79–103.

Johnson, M. (1987). The body in the mind: The bodily basis of imagination, reason, and meaning. *The body in the mind: the bodily basis of imagination, reason and meaning*.

Kimmel, M. (2005). Culture regained: Situated and compound image schemas. *From perception to meaning: Image schemas in cognitive linguistics*, pages 285–311.

Kuhn, W. (2007). An image-schematic account of spatial categories. In *International Conference on Spatial Information Theory*, pages 152–168. Springer.

Lakoff, G. and Núñez, R. E. (2000). *Where mathematics comes from: How the embodied mind brings mathematics into being*. Basic Books.

Lanham, R. A. (1991). *A handlist of rhetorical terms*. University of California Press Berkeley.

Miguel, L. H. (1990). Hoffman, maria, e.:" negatio contrarii. a study of latin litotes" (book review). *Emerita*, 58:346.

Mitrović, J., O'Reilly, C., Mladenović, M., and Handschuh, S. (2017). Ontological representations of rhetorical figures for argument mining. *Argument & Computation*, 8(3):267–287.

Mladenović, M. and Mitrović, J. (2013). Ontology of rhetorical figures for serbian. In *Text, Speech, and Dialogue*, pages 386–393. Springer Berlin Heidelberg.

Niles, I. and Pease, A. (2001). Towards a standard upper ontology. In *FOIS*.

O'Reilly, C. and Harris, R. A. (2017). Antimetabole and image schemata: Ontological and vector space models. In *JOWO*.

Schank, R. C. and Abelson, R. P. (1975). Scripts, plans, and knowledge. In *IJCAI*, pages 151–157.

Shovel, M. (2015). Litotes, the most common rhetorical device you've never heard of. https://www.theguardian.com/media/mind-your-language/2015/mar/26/litotes-the-most-common-rhetoric\al-device-youve-never-heard-of). Accessed: 2018-10-28.

Taboada, M., Trnavac, R., and Goddard, C. (2017). On being negative. *Corpus Pragmatics*, 1:57–76.

Yuan, Y. (2017). The argumentative litotes in the analects. *Argument & Computation*, 8:253–266.