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A Lattice Theoretic Look:

A Negated Approach to Adjectival

(Intersective, Neutrosophic and Private)

Phrases

Neutrosophic Set and Logic in Intelligent Systems

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Motivation

- Lattice theory, is a powerful tool of many areas such as linguistics, chemistry, physics, and information science.

- Especially, with a set theoretical view, lattice applications of mathematical models in linguistics are a common occurrence.

- The concept "Lattices of phrases" is one of the main work discipline in Linguistics which provides investigation of mathematical models of phrases.

Neutrosophy

- Introduced by Smarandache, mathematically, it presents a system which is an extension of fuzzy systems.

- Neutrosophy considers an entity, "A" in relation to its opposite, "*anti - A*" and that which is not A, "*non - A*", and that which is neither "A" nor "*anti - A*", denoted by "*neut - A*".

Phrases As Sets

Phrases such as "red cars" can be interpreted the intersection of the set of *red things* with the set of *cars* and get the set of "red cars".

In the sense of model-theoretic semantics, the interpretation of a phrase such as *red cars* will be the intersection of the interpretation of *cars* with a set of *red individuals.*

Negating Intersective Adjectival Pharases

Here, we have four phrase forms:
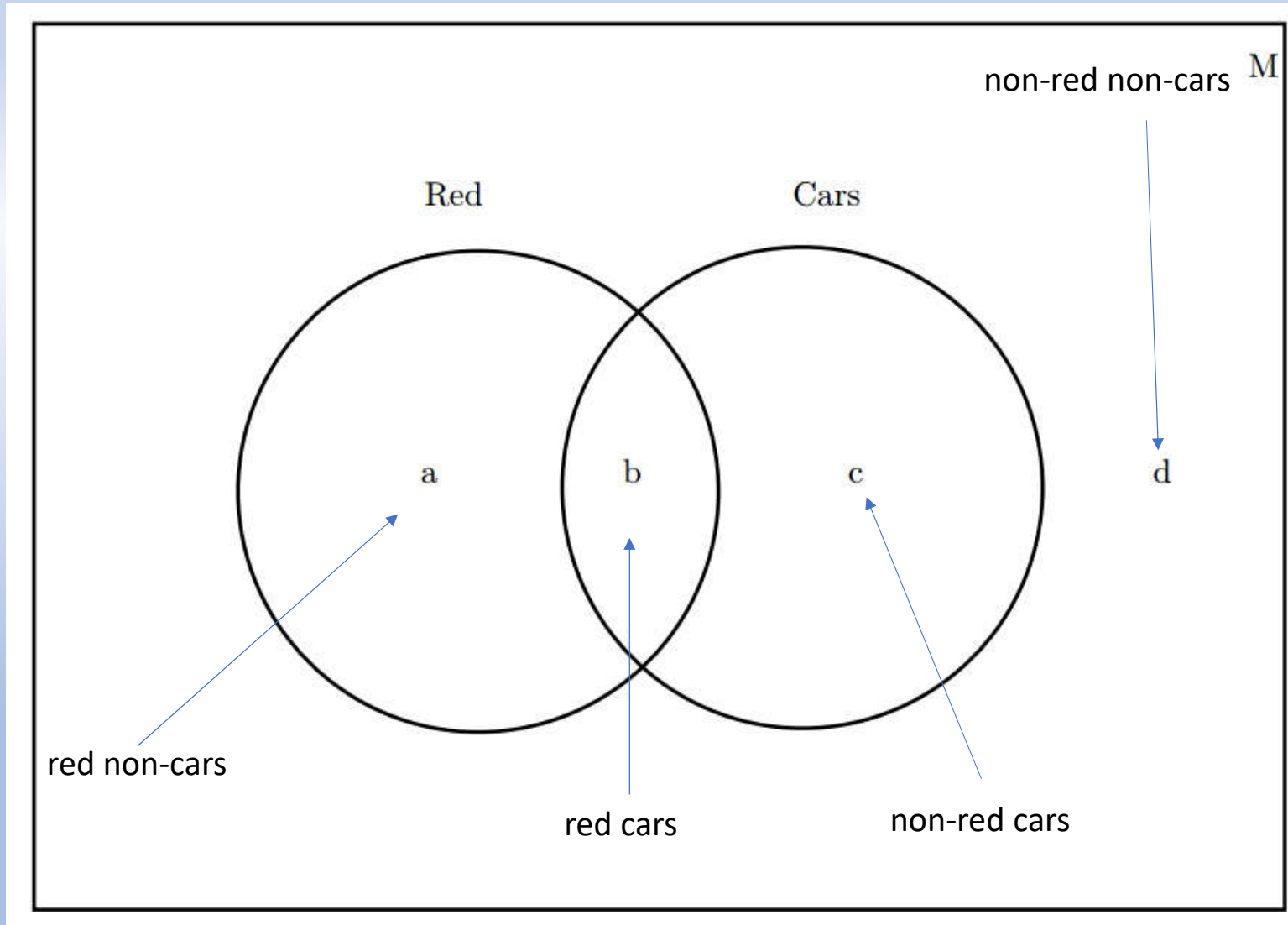
red cars   red non-cars   non-red cars   non-red non-cars

Figure 1

Lattice Structure

- A lattice is an algebraic structure that consists of a partially ordered set in which every two elements have **a unique supremum** (a least upper bound or join) and **a unique infimum** (a greatest lower bound or meet)

- The most classical example is on sets by interpreting set intersection as meet and union as join. For any set A, the power set of A can be ordered via subset inclusion to obtain a lattice bounded by A and the empty set.
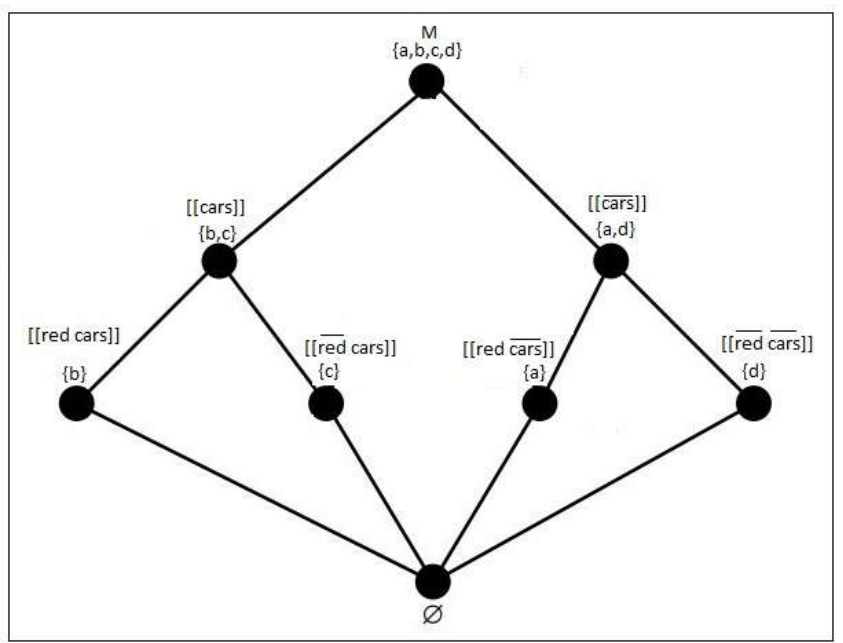
- We define a binary set operator $\cup^*$ for our languages as the follow: Let S be a set of sets and *A, B in S*.

- $A \cup^* B = C$ if and only if C is the smallest set which includes both A and B, and also *C in S*.

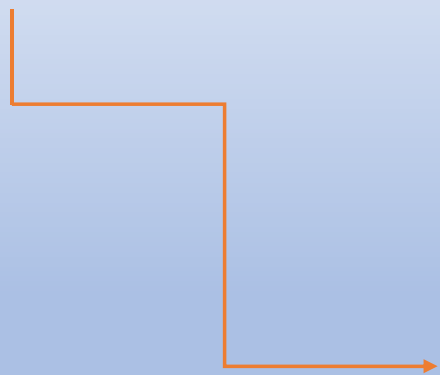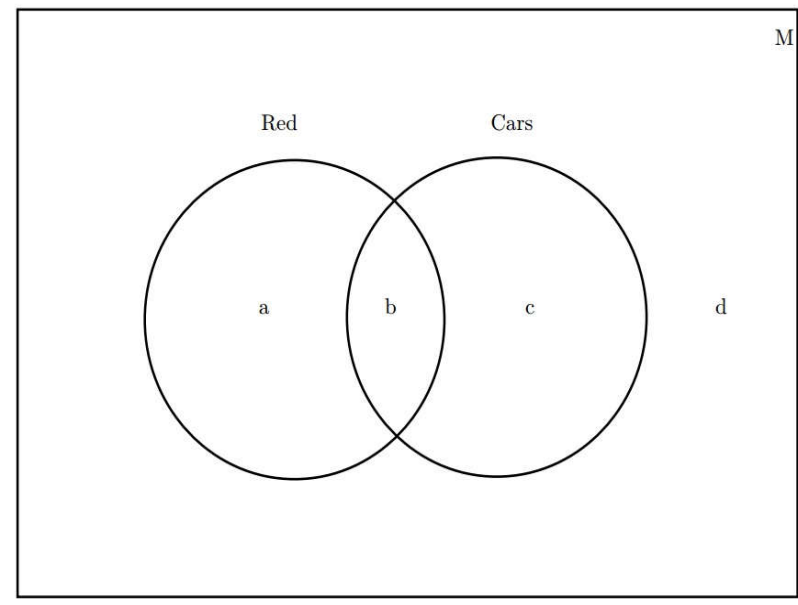- We define a partial order $\leq$ on sets as follows:

- $A \leq B$ if and only if $B = A \cup^* B$
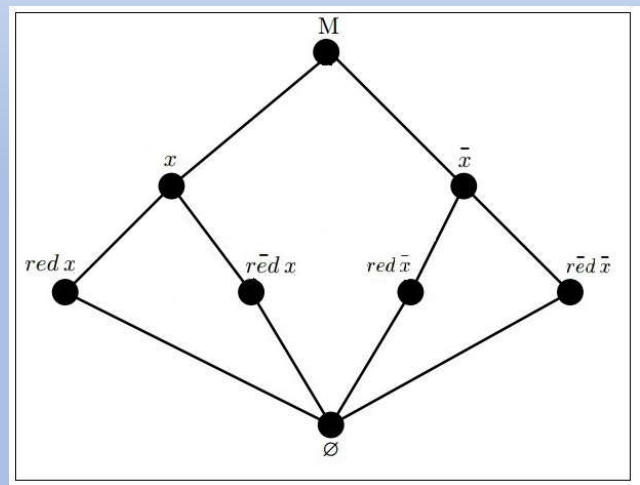
- $A \leq B$ if and only if $A = A \cap B$

$\cap$ is the usual intersection

The interpretation of the set

The lattice form

The Extension of The Lattice By Neutrosophy
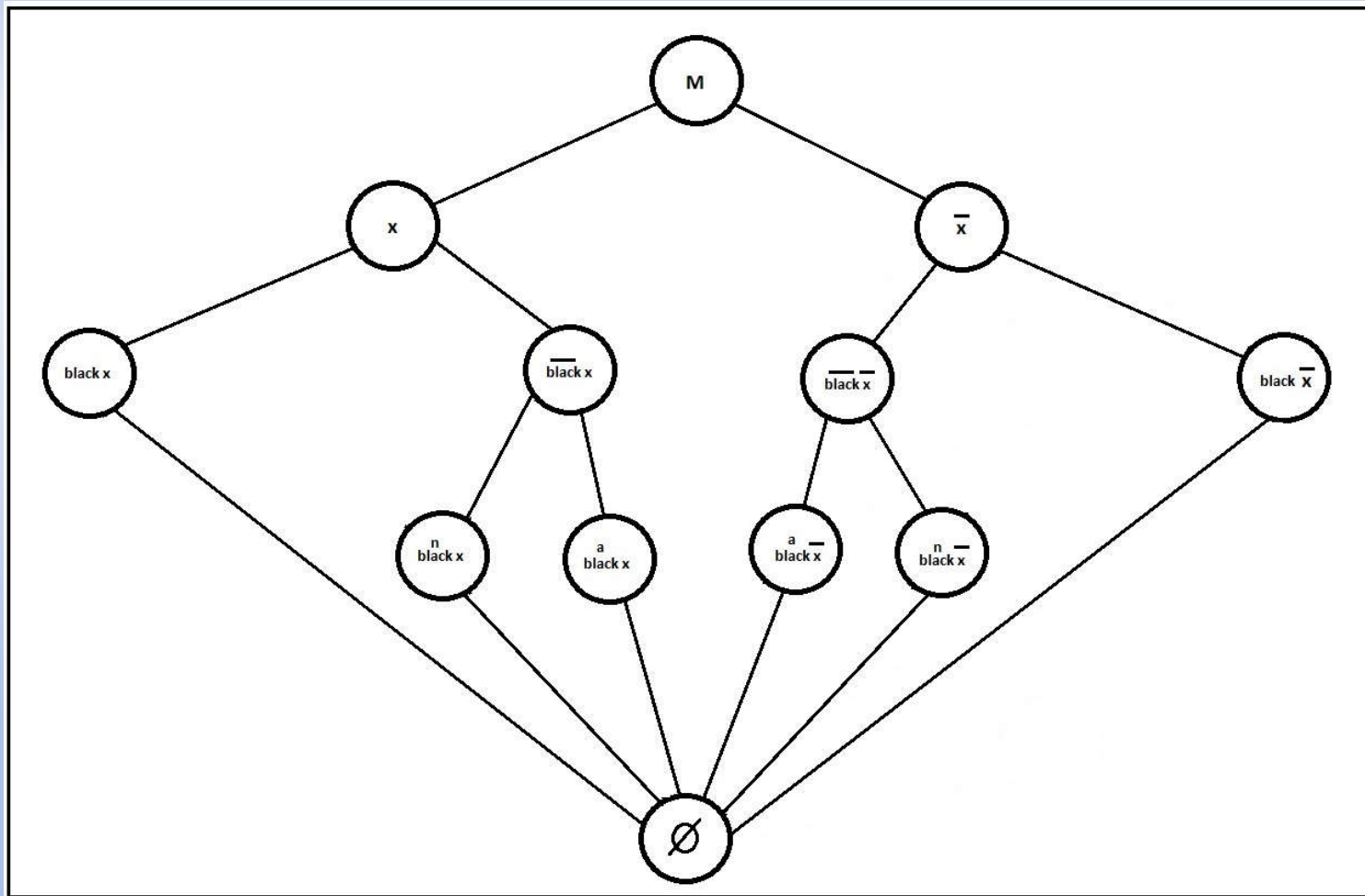
Here, we have four phrase forms:

black cars   black non-cars   non-black cars   non-black non-cars

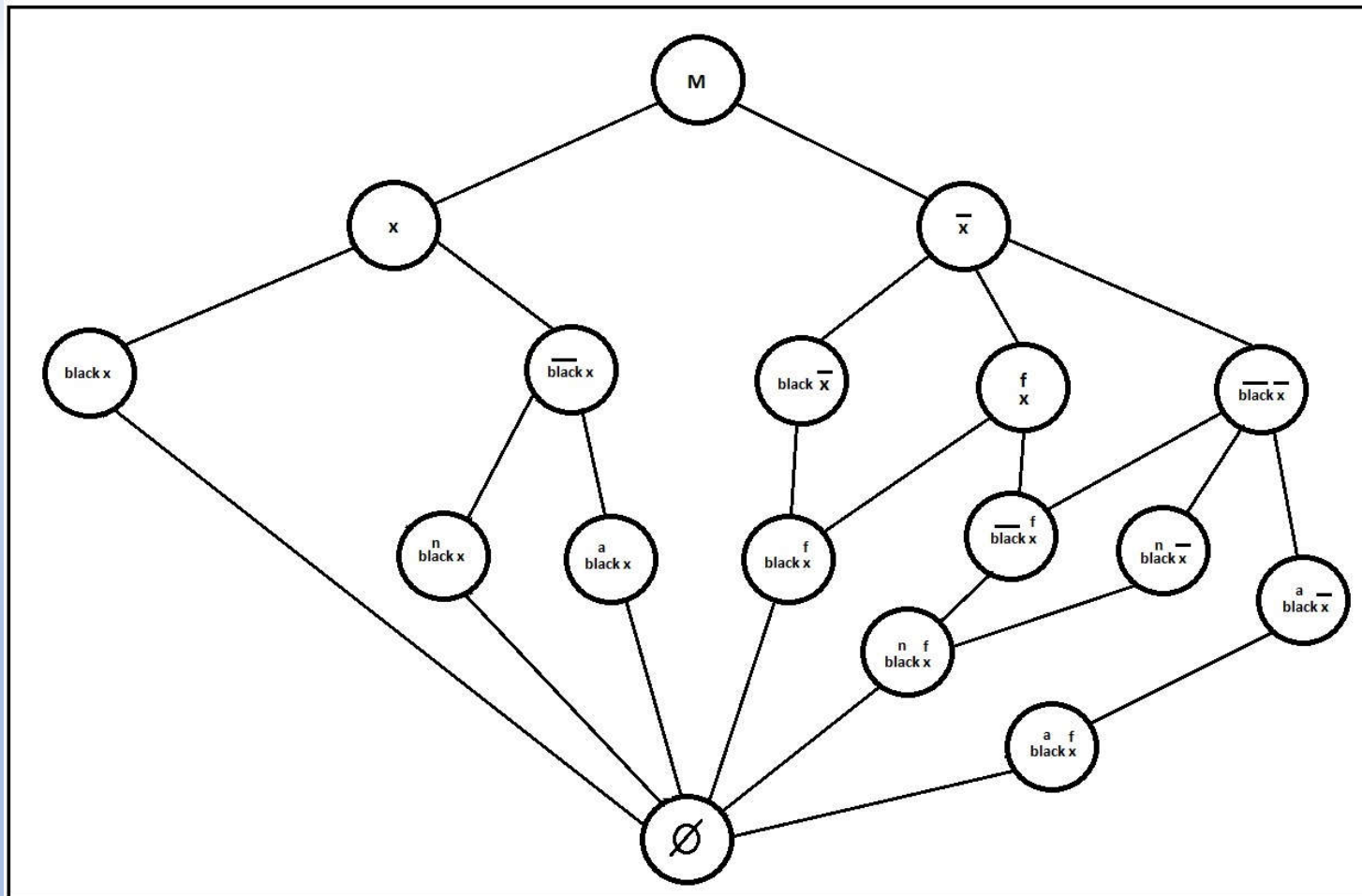→   neut-black cars   anti-black cars (white cars)

→   neut-black non-cars   anti-black non-cars (white non-cars)

The Extended Lattice by Neutrosophy

* x for nouns (cars)

Adding 'fake' ,
fake x is a subset of non-x

Conclusion

- In this talk,

- we have proposed some new negated versions of set and model theoretical semantics of intersective adjectival phrases (plural).

- After we first have obtained a lattice structure *by negated phrases*, two lattices have been built from the proposed phrases by adding 'neut', 'anti' and 'fake' step by step.

Open Questions

- It might be interesting that lattices in this paper can be extended with incorporating coordinates such as *light red cars* and *dark red cars*.

- One might work on algebraic properties as filters and ideals of the lattices considering the languages.

- Some decidable logics might be investigated by extending syllogistic logics with the phrases.

- Another possible work in future, this idea can be extended to complex neutrosophic set, bipolar neutrosophic set, interval neutrosophic set.

Hopefully

linguists, computer scientists and logicians might be

interested in results in this paper and the results will help with other

results in several areas.

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Thank you,

Any question?