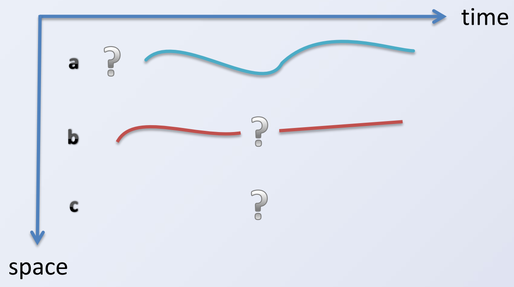
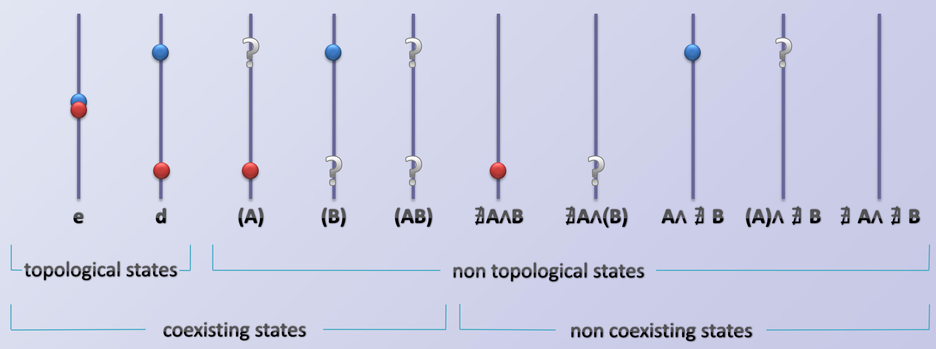
# Life and Motion Configuration

## Spatio-Temporal States




**Spatio-temporal (S-T) evolutions of objects** can be rather complex**,** it is **not limited to sharing or not sharing common place during given time interval.** Questions like existence, appearance, presence … occur.
*What is the "spatio-temporal status" of a baby before his birth (a)?*
*Is a key still present when in a pocket (b)?*
*When does a person start to exist for a bank (c)?*

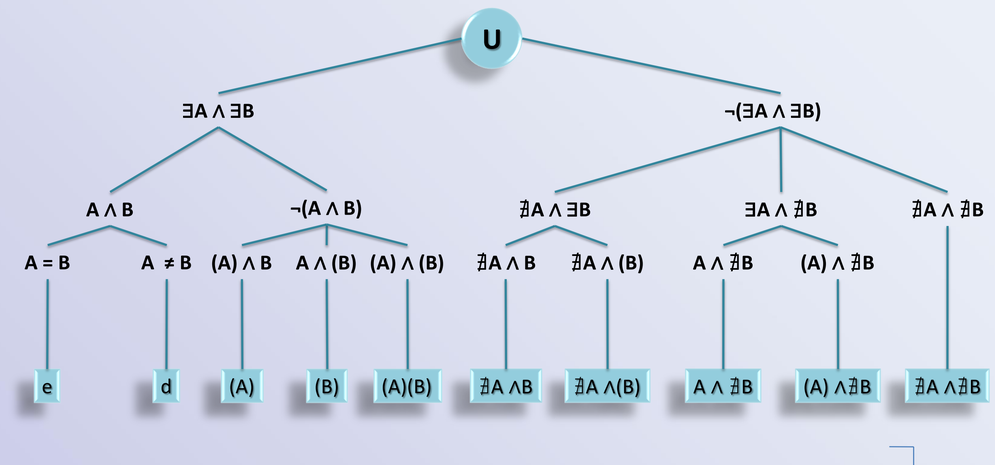
**A new representation of relationships between objects** is presented. It **gathers notions of existence, presence and spatial interaction** between two objects at a given time into a concept called "**spatio-temporal states**". A "S-T state" is defined *as a particular relationship between two objects at a given time*. The model is currently developed for point objects only.



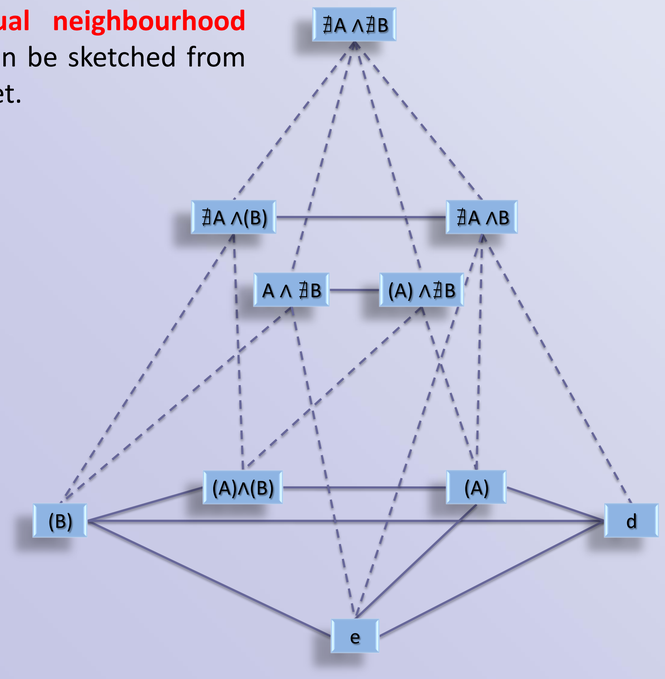

A set of **ten spatio-temporal states** is constructed using basic topological relationships and binary properties of presence and existence.

## Reasoning on S-T States

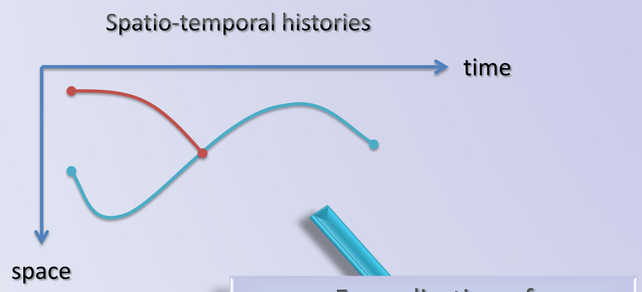
S-T states compose a **jointly exhaustive and pairwise disjoint set** of relationships. They can be organised as **decision tree**.




**A conceptual neighbourhood diagram** can be sketched from S-T States set.



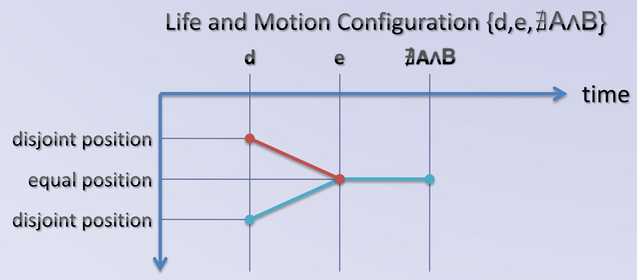

## Life and Motion Configuration Generation

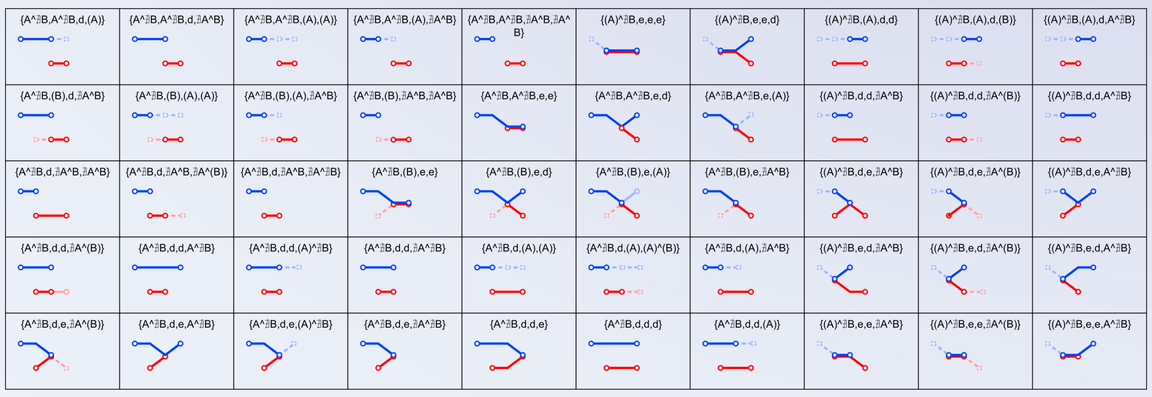



An **infinite number of spatio-temporal histories** exists. Formalizing S-T histories with successive S-T states leads to a **finite set of Life and Motion Configurations (LMC)**.

Fromalization of
S-T histories with
Life and Motion Configurations

S-T histories with **same properties** of spatial relation, presence and existence will be formalized in a **same Life and Motion Configuration**.

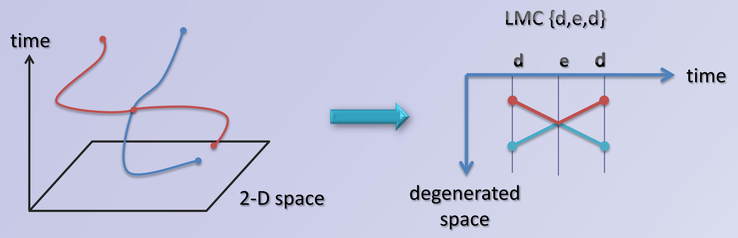


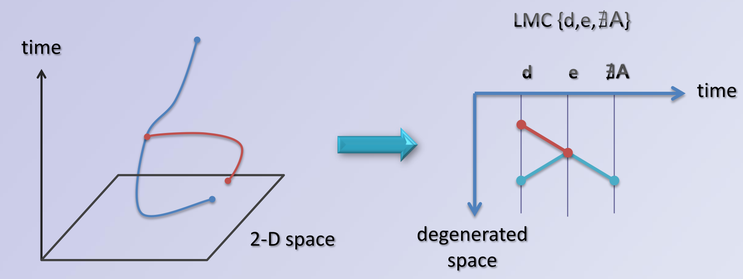

Subset of the 4435 possible Life and Motion Configurations of level 4

## Life and Motion Configuration Application

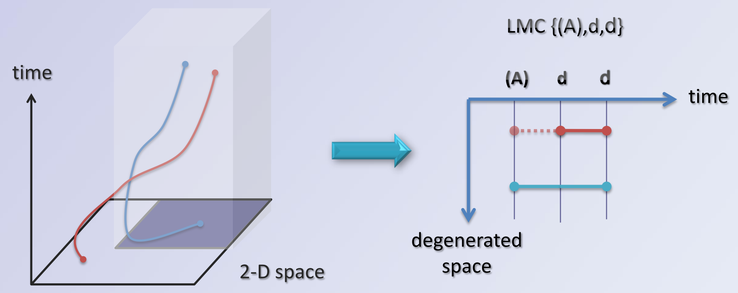
Reasoning on **LMC provides** important **information on each similar situation**. Three crime mapping examples of S-T relationships between a murderer (blue) and his victim (red) are presented.




These S-T histories present a **spatio-temporal meeting**, the victim escapes his murderer. These relations could be retrieved with LMC with a {d,e,d} form.




This shows a **spatio-temporal interception**, the murderer kills his victim. LMC with {∄A} just after {e} shows this relation.




Information is provided from **analysed area** (grey box) **where the murderer is tracked**. The victim exists but is **not present** at first. LMC manages this property with the absence sign (A).

These examples show the **usefulness of the Life and Motion Configurations** constructed on **basic operators of topology extended with concepts of presence and existence** to reason on spatio-temporal situations.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