Topological Approach of the Golgi Apparatus: Towards a Discriminating Modelling?

M. Poudret, J.-P. Comet, P. Le Gall, A. Arnould and P. Mesure

A Topological Approach

Modelling Biological Compartments

- Most of the biological mechanisms depend on:
  - molecules exchanges between membrane-bounded compartments;
  - dynamics of the neighbouring relations within the compartmentation;
  - the topology of the Golgi apparatus is misunderstood and several representations exist.

The Golgi Apparatus is an organelle of the secretory pathway of the living cell. It has a strong topological structuration. Because of observation limitations, the topology of the Golgi apparatus is misunderstood and several representations exist.

Representing both topology, biochemistry and geometry with topology-based geometric modelling. We propose a framework that may help biologist in discriminating Golgi Apparatus representations.

Towards a Discriminating Modelling?

Phagocytosis

The Golgi Apparatus

Towards a Discriminating Modelling?

- modélisation for biological cellular processes. In order to propose our tools to non computer science experts, we have to improve the abstraction level of our transformation rules. A good level may work directly on compartments, abstracting the n-G-maps basic elements.

Perspectives

- the recognition of all dynamical aspects is not finished yet. We have to complete the writing of the transformation rules that can be use in order to animate these models.

Finally, we have sketched the models refinement loop that may help the biologist to find relevant parameters that discriminate the Plate Stack and the Tower model.

References


Plate Stack model

Tower model

Transformation Meta-rule

Plate Stack model

Tower model

Only one model is coherent