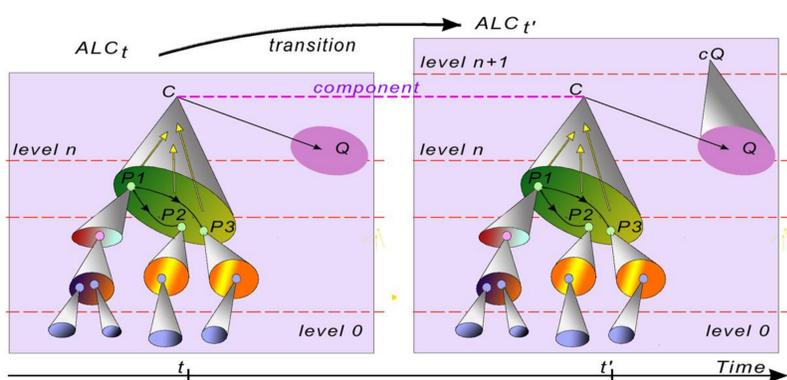


## Formal conditions for creative anticipation processes

by A. Ehresmann\*, M. Béjean and J.-P. Vanbremeersch

What characteristics should a social system have to become an *Anticipation Literate Community ALC* by integrating a net AN of (human or not) anticipators able to develop what Riel Miller [1] calls *Futures Literacy FL*?

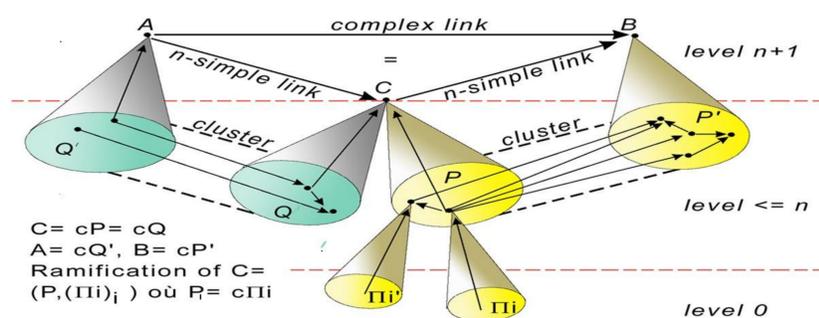
The system is modeled by a *Memory Evolutive System* (Ehresmann & Vanbremeersch [2]). The configuration of *ALC* at time  $t$  (i.e., its components of any kind and complexity and their *links*) is represented by a hierarchical category. The transition from  $t$  to  $t' > t$  is generated by *complexification* processes consisting in the addition or loss of some components and formation of new components  $cQ$  binding (= 'colimit' of) a pattern  $Q$  of linked components.



The dynamic is directed by a net of internal 'co-regulators' (including AN), each acting at its own rhythm with the help of the Memory.

### 1. Characteristics necessary for creative anticipation

(i) The *Multiplicity Principle*: MP asserts the existence of components  $C$  which are *multifaceted*, in the sense that they can operate through (i.e., as 'colimit' of) several structurally different lower level patterns and switch between them. MP allows the existence of *complex links* which do not bind clusters of lower level links (cf. Figure); their emergence will represent 'change in the conditions of change' (Popper).

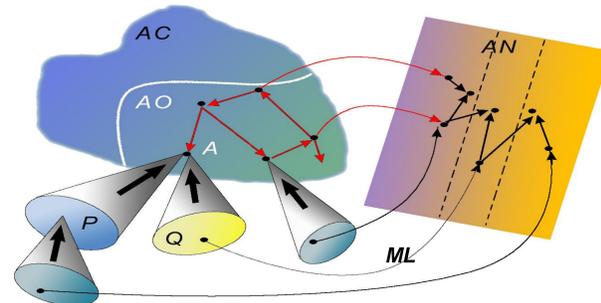


**Theorem [2].** (i) Without MP the complexity order of a component  $C$  (= minimal length of a ramification of  $C$  down to level 0) would be 0 or 1. (ii) With MP, iterated complexifications are not reducible to a unique one, and they lead to the emergence of components of increasing complexity orders, in particular allowing the development of a flexible and robust hierarchical memory.

(ii) *Formation of an Archetypal Core. AC* is a nexus of the memory which consists of higher order multifaceted polysemous components integrating significant knowledge of various modalities; they are strongly interconnected by complex links which form self-maintaining archetypal loops. *AC* acts as a dynamic flexible internal model, playing a central part in collective intelligence and anticipation.

### 2. Development of FL

During an anticipation process, each anticipator of AN collects partial information from *ALC*, e.g. from *AC*, thus forming its initial landscape; communication with others will extend their landscapes. In particular the process leads to distinguish a common archetypal pattern *AO* which will be at the basis of FL:



**FL1:** Activation of *AO* diffuses to lower levels along ramifications and switches between them, thus extending spatially and temporally the landscapes of the anticipators. It leads to the formation of a *Macro-Landscape ML* which unites these landscapes and represents both explicit and tacit knowledge shared by all, possibly including emotions and making the tacit explicit. A *retrospection* process is developed in *ML* for horizon-scanning, sense-making and forecasting.

**FL2:** It consists in a *prospersion* process through successive *MLs* to find more original scenarios and evaluate their results by 'virtual' complexification (inside *ML*)

**FL3:** Selection of a scenario. The scenario may lead to a really *novel future* when it relies on iterated complexifications which introduce change in the conditions of change (via the emergence of complex links, cf. Theorem).

FL levels can be compared to Boden's 3 kinds of creativity.

FL	Creativity	ALC	Kind of future
FL1	Combinatory	Retrospection in ML	Optimal
FL2	Exploratory	Prospersion. Scenarios	Contingent
FL3	Transformational	Choice with iterated complexifications	Novel Future

[1] R. Miller, *Futures* 39 (2007)

[2] Ehresmann & Vanbremeersch, *Memory Evolutive Systems*, Elsevier (2007).