Interaction maximization as an evolution principle for social systems Part III: A global view of complexification in physical, biological and social systems

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Interaction strength	System	Effect of	Homeostatic	
1 weak	035	mixing	no	
interaction	stars in calaxy	mixing	no	
interaction	stars in galaxy	mixing	no	
		niixiiig	IIO	
	prokaryotic communities	?	1	
•	nomads in vast plain	mixing	no	
1 strong	liquid	yes/no	no	
interaction	solar system	yes/no	no	
	solid	no	no	
•	group of farmers	no	no	
•	group with same language	no	no	
•	corporation	yes/no	yes	
•	state	no	yes	
Several strong	star	no	yes	
interactions	bacteria	no	yes	
	swarm of bees	no	yes	
	nest of ants	no	yes	
	animal	no	ves	

Classification of physical, social, biological systems based on interaction strength

Notes:

 Homeostatic regulation refers to the capacity of maintaining constant internal conditions (temperature, concentration in calcium and other minerals) despite changing external conditions. At this point it is not clear whether stars have that capacity or not.

yes

• The yes/no indication for liquids means that some liquids are miscible while other are not depending on the compatibility of their respective interactions. Similarly, the yes/no indication for corporations means that a merger (or buy-out) between two corporations may or may not succeed in creating a new entity which is commercially successful; the case of Daimler-Chrysler which eventually ended in a break-up (2007) illustrates a failed merger.

• For two groups of people speaking different languages, mergers do not result in stable mixings. however the transient state can last several centuries as shown by the colonization of the Gaule by the Romans or the colonization of India by Spain. In some cases, as for the Hispanic colonization of South America the language of the colonizer gains widespread acceptance.

• As interactions become stronger systems acquire greater cohesion which results in two opposed trends: (i) systems loose their ability to mix one with another into a bigger system. (ii) systems become more regulated with respect to external perturbations.

• Blue dots signal social systems.



Complexification processes for physical entities



Order of magnitude of the size of some elementary entities.



Complexification processes for non-physical entities

It can be observed that the first bacteria appeared on earth 3 billion years ago while the first multicellular organisms (at least for those for which there is fossil evidence, such as sponges) appeared 1 billion years ago. Thus, the step from single cells to multicellular organisms took 2 billion years.



Stability of physical versus social entities.

To get a better understanding of social systems the first requirement seems to be a methodology for measuring the stability of simple social systems. This will be the topic of the next lecture.