Technological Learning in the Energy Sector
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Quantum Modelling of the Learning Curve
– achievements and prospects

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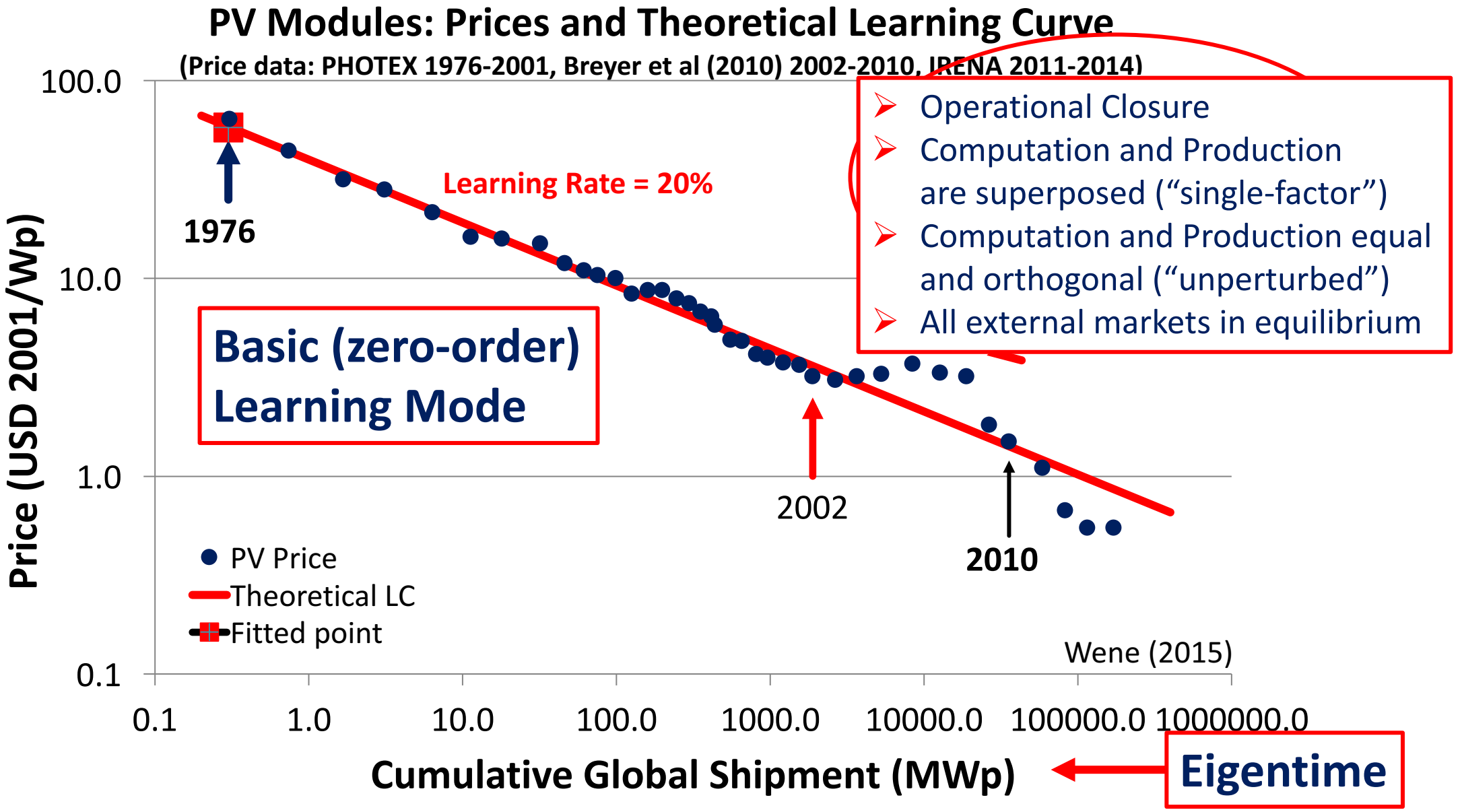
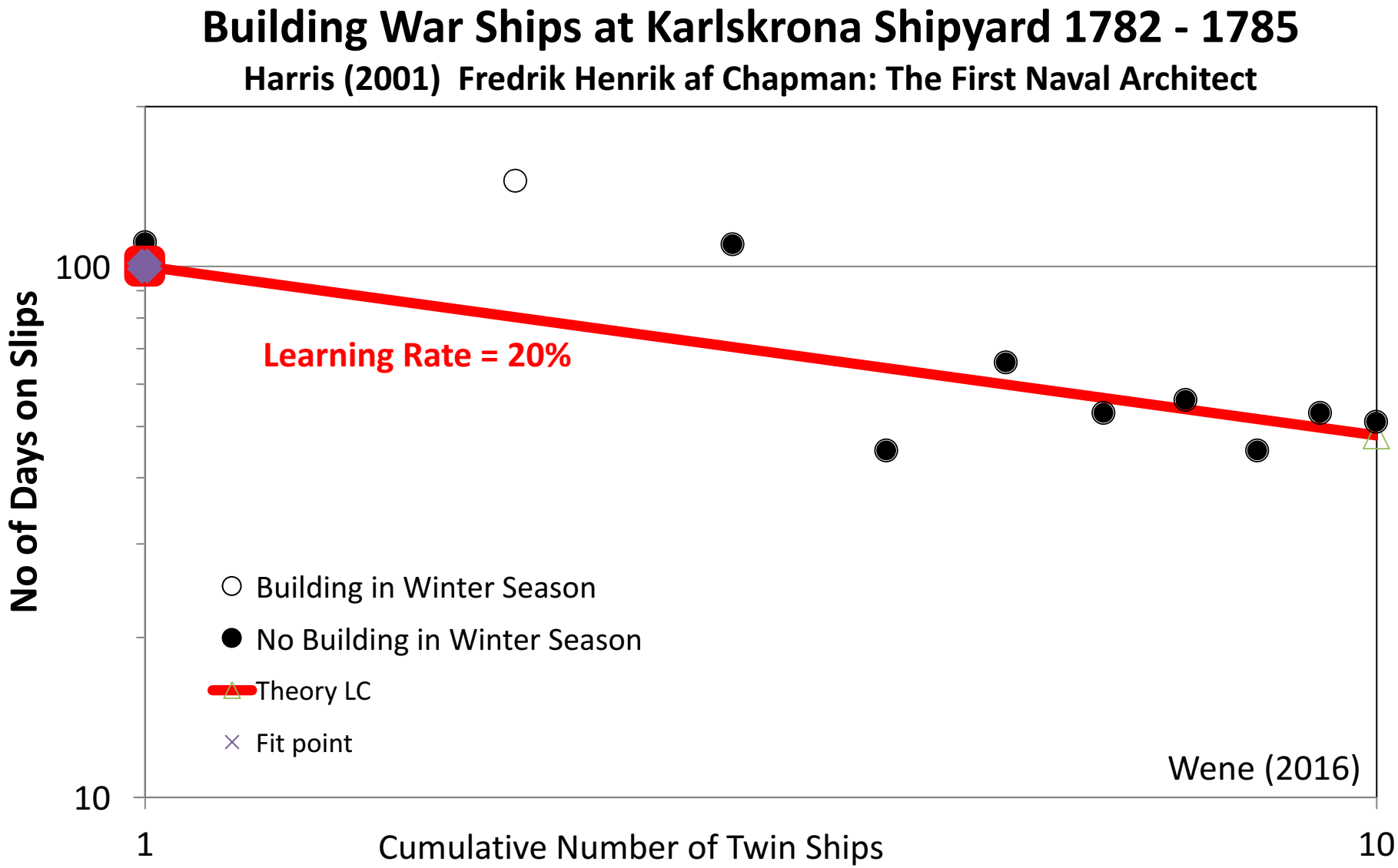
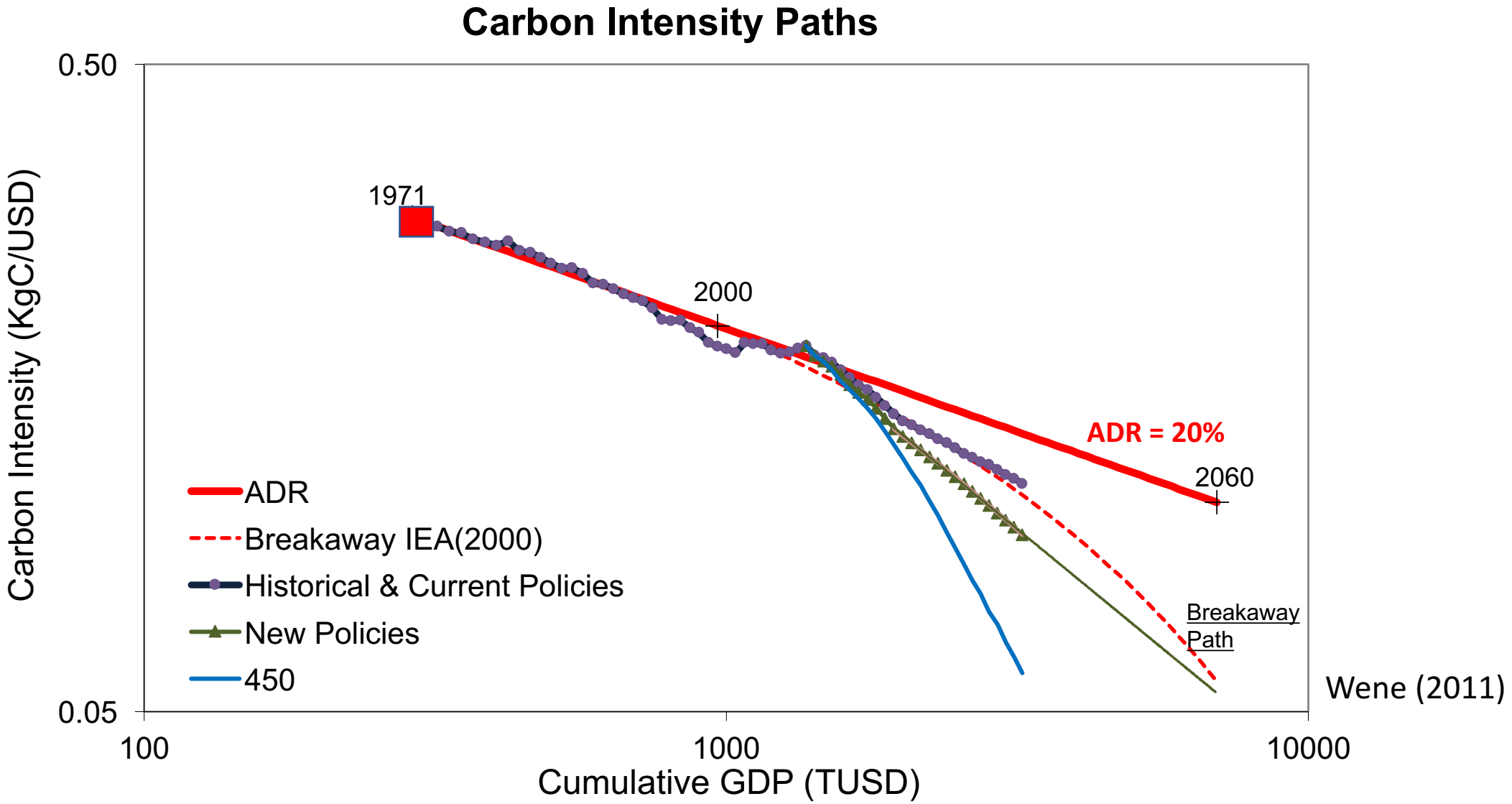
Quantum-like Model: Mathematical shape and Learning Rate



The Pervasive Basic Mode : a 230 year old learning curve

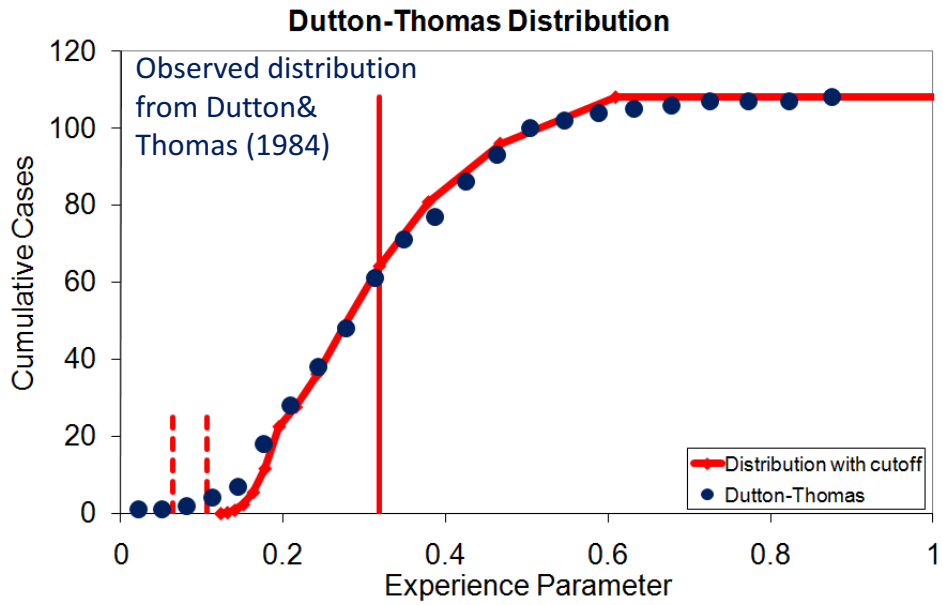


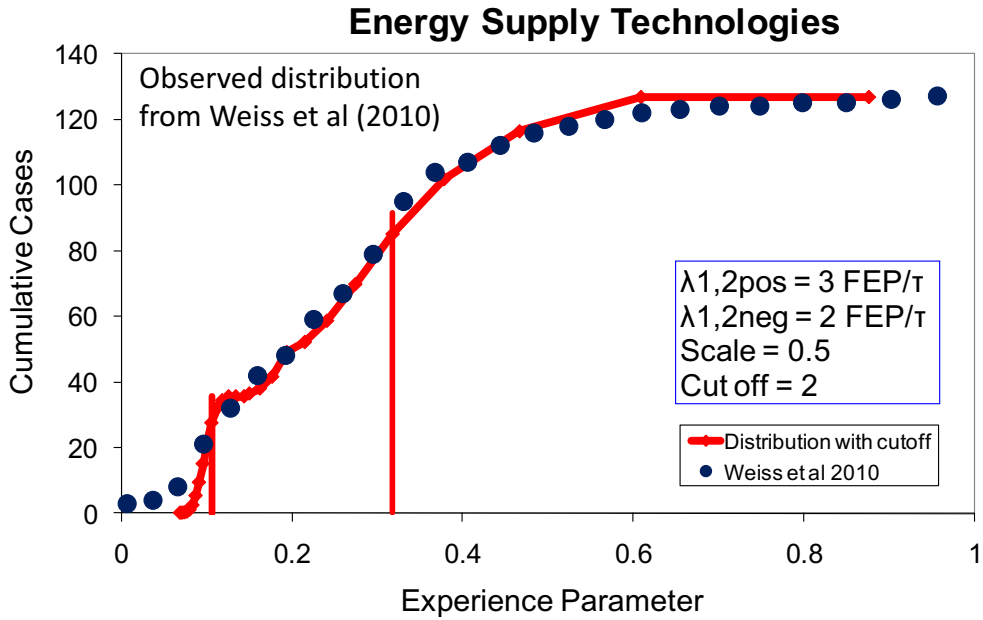
Pervasive BLM: Decarbonisation of industrial activities on global scale



Learning Rate dispersion: The learning system adapting to perturbations

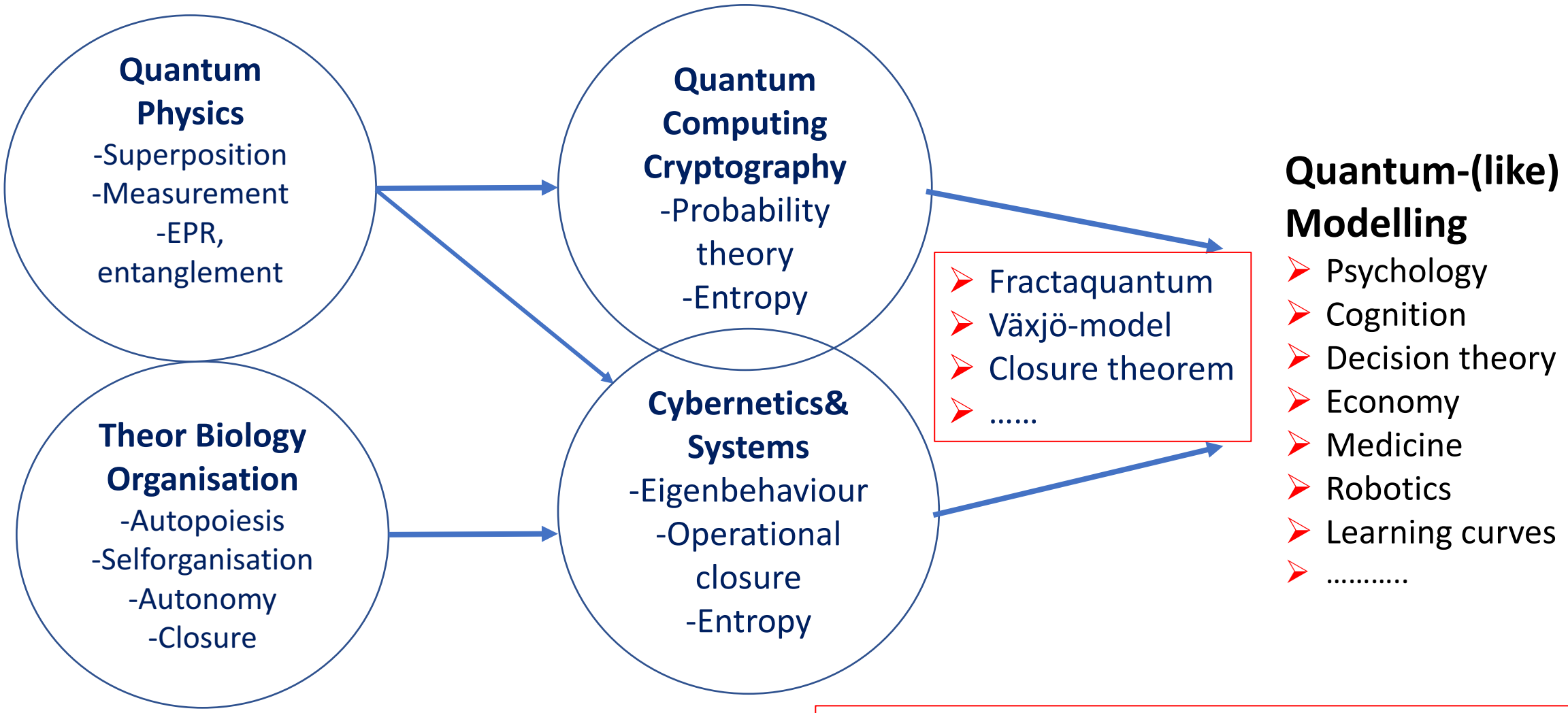
(Wene 2010, 2011)





- The earlier cybernetic theory for learning curves (Wene 2007, 2010) could reproduce observed distributions of learning rates
- But could not be used to identify effects of specific types of perturbations on individual technologies
- Quantum modelling provides tested quantitative formalism to measure effects of specific perturbations (”double closure”)

Quantum Modelling outside physics is a strongly growing field



Conclusion: Quantum theory will be needed also in curriculum outside physics&chemistry !

Thank You !

More reading

Wene, C.-O, (2016), “Future energy system development depends on past learning opportunities”
WIREs Energy Environ Vol 5:1, pp. 16–32, doi: 10.1002/wene.172.
Wene, C.-O. (2018), “Quantum Modelling of the Learning Curve”, *Futures,* to be published in Special Issue: