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Analysis and Synthesis in Information Processing and Knowledge Creation

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Abstract: This paper investigates the fate of original information after it is synthesized into knowledge, focusing on whether it becomes entangled within the integrated knowledge or if it is retained as isolated units in long-term memory. We explore two possibilities: either synthesized knowledge removes original information from memory, or both integrated and insulated information are stored once the information becomes part of knowledge. To address these questions, we simulate problem-solving processes over time. The simulation reveals how, once information is integrated into knowledge, it is removed as an insulated piece of information in the long-run memory. The process also shows a dynamic interplay between the creation and fragmentation of knowledge induced by synthetic and analytical skills. Furthermore, we examine whether the analytical-synthetic (A-S) process, as an autonomous system, tends to diverge or converge toward a steady state. We identify a stable stationary point in the process of knowledge creation and fragmentation. We also discuss how novelty can emerge exogenously (through errors) or endogenously and how it oscillates within the (A-S) process when heterogeneous information and knowledge are considered. Finally, we identify a chaotic transition in the way knowledge and theories compensate for reduced information.

Keywords: memory cues, information processing, knowledge creation, knowledge - information coevolution, simulation, dynamic systems