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A Dynamic Memory Model

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Abstract: We introduce a mathematical model of evolution of a memory trace. The model generalizes similar dynamical systems models used in other research areas of cognitive science as well as physics and other sciences (e.g. transport processes of radiation). We then simulate an experimental data set and argue that the model may well simulate complexity of serial recall reported in Anderson, J. R., Bothell, D., Lebiere, C. Matessa, M. (1998). An integrated theory of list memory. *Journal of Memory and Language*, 38, 341-380. Finally, we argue that in the future our model may be used to simulate seemingly broad spectrum of memory research data: familiarity effects and rate of presentation effects in list memory, attention, false memory, instructions in memory tasks, and noise and phase transitions in neural networks and other dynamic systems. Our hope is that this kind of work may help integrate data while showing constraints useful for directing future research in cognitive science.