Avi Wigderson*, Institute for Advanced Study, School of Mathematics, Einstein Drive, Princeton NJ 08540. The power and weakness of randomness (when you are short on time).

Man has grappled with the meaning and utility of randomness for centuries. Research in the Theory of Computation in the last 30 years has enriched this study considerably. I will talk about two main aspects of this research on randomness, demonstrating its power and weakness respectively.

(1) Randomness is paramount to computational efficiency. I will show how the use of randomness can dramatically speed up computation (and do other wonders) for a variety of problems and settings.

(2) Computational efficiency is paramount to understanding randomness. I will explain the new, computationally-motivated definition of randomness, and try to argue its merits as the “right” definition. I will then show how such randomness may be generated deterministically, from computationally difficult problems. (Received March 22, 2004)