Title: Separating adaptability from disorderliness as randomness notions

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Abstract:

In computability theory, we often formalize and compare notions of randomness of sets $H\subseteq\mathbb{N}$. We separated two such notions and describe our combinatorial argument as an infinite variant of the Monty Hall game: There are infinitely many doors arranged in a line, and game show host H hides a goat or car behind each one. Infinitely many doors hide cars. H plays against countably many gamblers. After H hides its cars, a gambler may select infinitely many doors to open, and wins if the proportion of cars in their selection is non-zero in the limit. As each gambler behaves like a computer program, the more ``randomly'' H hides its cars, the more likely it can beat a gambler. We show that a host that beats gamblers who choose doors out of order may not necessarily beat gamblers who select doors adaptively, and vice-versa. This separates adaptability from disorderliness as randomness notions. This is joint work with Justin Miller from Dartmouth College.