Title: How to throw at high speeds and how that made us human

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Humans are unique among primates in their ability to throw with remarkable accuracy at high speeds. Throwing involves the entire body, with a cascade of energy flow that starts at the legs and ends at the fingertips, leading to a fast, yet accurate throw. Using experiments with human subjects, we generate hypotheses on which morphological features are necessary to throw at such high speeds. We then use numerical optimization on these hypothetical models to find strategies that maximize throwing speed. The optimum is predictive of how a baseball pitcher throws, driven by torques at the hip, elastic energy storage at the shoulder, and kinetic energy transfer across multiple segments; resembling an elastically loaded whip. Finally, I present some early attempts to understand how humans maintain accuracy at high speeds mechanical and biomechanical experiments with humans. These studies all try to shed light on human evolution, specifically if and how the selection pressure to throw for hunting may have affected our upper body morphology.