

Text S3. Importance of DNAP parameters

Different parameters of nucleotide extension by DNAP can have a large effect on the shape of the time distribution at which nucleotides are written, even with the same mean replication rate. All three parameters (τ_c , τ_p , and P) affect the average speed with which DNA is replicated and thus the resulting misincorporation probabilities (Fig. S6A&D). Moreover, they each have different effects on the shape of the distribution, $\gamma_i(t; \theta_1)$. Longer regular extension durations (τ_c) primarily shift the distribution to the right. Longer pauses (τ_p) lead to a distribution with longer tails on the right hand side (Fig. S6B, green). The proportion of pauses (P) scales the weight of the tails (Fig. S6B, red). Thus, the specific, *in vivo*, dynamics of the polymerase can have profound implications on our ability to decode molecular ticker tapes. Fortunately, if a known signal can be applied, the molecular ticker tapes can be used to measure the behavior of the polymerase itself.