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Deheuvels, P.; Erdős, Paul; Grill, K.; Révész, P.
Many heads in a short block. (In English)
Mathematical statistics and probability theory, Vol. A, Proc. 6th Pannonian Symp., Bad Tatzmannsdorf/Austria 1986, 53-67 (1987).

[For the entire collection see Zbl 623.00015.]

Consider an i.i.d. sequence $X_1, X_2, ...$ with $P(X_1 = -1) = P(X_1 = 1) = 1/2$. Denote the partial sums by $S_0 = 0$, $S_n = X_1 + ... + X_n$, and set

$$I(N,K) = \max_{0\leq n\leq N-K}(S_{n+k} - S_n), \quad 1 \leq K \leq N, \quad N = 1, 2, ...$$

For $K_N/\log N$ bounded away from zero and infinity, the authors provide a precise characterization of the strong limiting behaviour of $I(N, K_N)$ in terms of UUC, ULC, LUC and LLC classes.

These results are based upon sharp probability inequalities on I(N,K), which are developed first. The cases of $K_N = [C\log N]$ with $C > 1$ or $K_N = \log N + o(\log N)$ are studied in more detail. A summary of further results on $I(N, K_N)$ for $K_n \leq C\log N$ or log $N \ll K_N \leq N$ completes the picture.

J.Steinebach

Classification:
60F15 Strong limit theorems
60F10 Large deviations

Keywords:
Erdős-Rényi law; strong theorems; large deviations; number of heads; law of iterated logarithm; sharp probability inequalities