Major index distribution

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Let $M_{q,n}$ be the probability space on the symmetric group S_n such that a permutation $\pi \in S_n$ is selected with probability proportional to $q^{\mathrm{maj}(\pi)}$, where $0 < q < 1$ and $\mathrm{maj}(\pi)$ denotes the major index of π. We describe an algorithm that realizes $M_{q,n}$. With it, pattern occurrences and cycle structure results are obtained for this distribution.