1069-05-45 **Bruce Sagan*** (sagan@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824, and **Carla Savage** (savage@cayley.csc.ncsu.edu), Department of Computer Science, North Carolina State University, Raleigh, NC 27695. *Mahonian Pairs.* Preliminary report.

We introduce the notion of a Mahonian pair. Consider the set, $\mathbb{P}^*$, of all words having the positive integers as alphabet. Given finite subsets $S, T \subset \mathbb{P}^*$, we say that $(S, T)$ is a *Mahonian pair* if the distribution of the major index, maj, over $S$ is the same as the distribution of the inversion number, inv, over $T$. So the well-known fact that maj and inv are equidistributed over the symmetric group, $\mathfrak{S}_n$, can be expressed by saying that $(\mathfrak{S}_n, \mathfrak{S}_n)$ is a Mahonian pair. We investigate various Mahonian pairs $(S, T)$ with $S \neq T$. Our principal tool is Foata's fundamental bijection $\phi : \mathbb{P}^* \to \mathbb{P}^*$ since it has the property that $\operatorname{maj} w = \operatorname{inv} \phi(w)$ for any word $w$. We consider various families of words associate with Catalan and Fibonacci numbers. Various other ideas come into play such as the ranks and Durfee square size of integer partitions, the Catalan triangle, and various $q$-analogues.

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