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# HOW FAST CAN PERMUTATION CLASSES SORT?

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Let us consider the following general model of sorting: we first fix a set of permutations $C$, which corresponds to the operations that we allow to perform in a single step. We then obtain as input a permutation $\pi$ of the set $[n] = \{1, 2, \ldots, n\}$. In every step, we pick a permutation $\sigma$ of length $n$ from $C$, and rearrange the current permutation of numbers by composing it with $\sigma$. The goal is to transform $\pi$ into the sorted sequence $1, 2, \ldots, n$ in as few steps as possible. The minimum number of steps needed to sort $\pi$ is the *$C$-sorting time* of $\pi$, and the maximum $C$-sorting time over all permutations $\pi$ of $[n]$ is the *worst-case $C$-sorting time*, denoted $wst(C; n)$,

This model of sorting captures not only classical sorting algorithms, like insertion sort or bubble sort, but also sorting by series of devices, like stacks or parallel queues, as well as sorting by block operations commonly considered, e.g., in the context of genome rearrangement.

The goal is to describe the possible asymptotic behavior of $wst(C; n)$ when $C$ is a hereditary permutation class, and understand which structural properties of $C$ affect its worst-case sorting time.

I will present the current state of knowledge in this area, with particular focus on my recent joint work with Michal Opler and Jakub Pekárek.