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SOME REMARKS CONCERNING THE PRESENT SITUATION IN CONSTRUCTING POLYA-TYPE EQUIVALENCE CLASSES

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At the end of my talk "On Graphs and their Enumeration" (see MATCH 1) I mentioned that there exists a bijection between the set of symmetry types of kind $(k_1, \ldots, k_{|Y|})$ under the symmetry group $H \leq S_X$, and the set of double cosets

$$S_{k_1} \times \ldots \times S_{k_{|Y|}} \gamma H$$

in S_X.

We used this fact in order to construct (not only to enumerate!) these types explicitly. Let me just mention what the present situation is.

Starting with an available double-coset routine we did not reach very far. Hence we applied the ideas of H. Brown of the Stanford group and a few other tricks in order to get a new double-coset routine which regards the fact, that the first one of the two groups is a direct product of Young subgroups.

Applied to the problem of constructing all the isomorphism types of graphs without multiple edges and loops, this program does at the moment the construction of all the graphs of 8 points (this sounds poor, but it is in fact a problem of evaluating the double-cosets

$$S_{k_1} \times S_{k_2} \gamma S_8^{\{2\}} \leq S_{28}$$

for each partition (k_1, k_2) of 28).

The time needed for this on a TR 440 was e. g.

kind of problem	seconds
$S_8 \times S_7 \gamma S_6^{\{2\}}$	27
$S_{11} \times S_{10} \gamma\ S_7^{\{2\}}$	1646

I would be very thankful, if the readers of MATCH could tell me how far they - or anybody else - came, if they attacked this problem, too.