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Bryan Curtis, Bryan Shader* (bshader@uwyo.edu) and **Jason Williford**. *Sign patterns of orthogonal matrices.*

At one of the earliest conferences on combinatorics, Miroslav Fielder put forth the challenge of characterizing the sign-patterns of real orthogonal matrices. Today, over 70 years later, that challenge remains largely unmet. This talk will discuss some recent advances that utilize a mix of analysis, matrix theory, and combinatorics. In particular, it is shown that if A is the adjacency matrix of a doubly regular tournament, then each sign-pattern obtained from the $I - A$ by replacing some of its zeros by $+1$ or -1 is the sign-pattern of an orthogonal matrix. (Received August 12, 2020)