1120-05-98 **Kyungyong Lee*** (klee24@unl.edu), Li Li and Nicholas A Loehr. A combinatorial approach to the symmetry of q,t-Catalan numbers.

The q, t-Catalan numbers $C_n(q, t)$ are polynomials in q and t that reduce to the ordinary Catalan numbers when q = t = 1. These polynomials have important connections to representation theory, algebraic geometry, and symmetric functions. Haglund and Haiman discovered combinatorial formulas for $C_n(q, t)$ as weighted sums of Dyck paths (or equivalently, integer partitions contained in a staircase shape). This paper undertakes a combinatorial investigation of the joint symmetry property $C_n(q, t) = C_n(t, q)$. We conjecture some structural decompositions of Dyck objects into "mutually opposite" subcollections that lead to a bijective explanation of joint symmetry in certain cases. A key new idea is the construction of infinite chains of partitions that are independent of n but induce the joint symmetry for all n simultaneously. Using these methods, we prove combinatorially that for $0 \le k \le 9$ and all n, the terms in $C_n(q, t)$ of total degree $\binom{n}{2} - k$ have the required symmetry property. (Received February 16, 2016)