

# Shape-Wilf-equivalences for vincular patterns

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We extend the notion of shape-Wilf-equivalence to vincular patterns (also known as "generalized patterns" or "dashed patterns"), and explore the implications for Wilf-classification of the set of vincular patterns. Shape-Wilf-equivalence is a stronger relation than Wilf-equivalence which can lead to families of Wilf-equivalences. In particular we strengthen a result of Elizalde and Kitaev by showing  $\sigma \oplus 1$  is shape-Wilf-equivalent to  $\tau \oplus 1$  whenever  $\sigma$  and  $\tau$  are Wilf-equivalent consecutive patterns. We also prove that 1-23 is shape-Wilf-equivalent to 3-12 and that 1-32 is shape-Wilf-equivalent to 3-21. This settles the Wilf-equivalence of 12-3-4, 12-4-3, 21-3-4, and 21-4-3 conjectured by the author and Pudwell, as well as the Wilf-equivalence of 3-12-4, 1-23-4, 1-32-4, and 3-21-4.