1131-53-264 **Laney Bowden**, **Jason Cantarella**, **Andrea Haynes**, **Tom Needham** and **Clayton Shonkwiler*** (clay@shonkwiler.org), Colorado State University, Department of Mathematics, Campus Delivery 1874, Fort Collins, CO 80523, and **Aaron Shukert** and **Gavin Stewart**. *The Geometry of Polygon Space: Acute Triangles, Convex Quadrilaterals, Flag Means, and More.*

"Three Points are taken at random on an infinite Plane. Find the chance of their being the vertices of an obtuse-angled Triangle."

This is the text of Lewis Carroll's Pillow Problem #58, from 1884. This and similar problems (e.g., "what's the probability that a random quadrilateral is convex?") sparked intense debate in the 19th century as mathematics was just starting to get to grips with the basics of geometric probability.

Using Carroll's problem as motivation, I will describe an identification between the space of planar n-gons and the Grassmannian of 2-planes in $\mathbb{R}^n$ inspired by work of Hausmann and Knutson. This identification allows us to leverage the geometry of the Grassmannian to compute the exact probability that a triangle is obtuse and that a polygon is convex and to determine the most scalene triangle.

Though this work is focused on planar polygons with few edges, it provides a template for integration and clustering in the physically-relevant setting of polygons in space, which are used to model ring polymers in solution. (Received July 17, 2017)