

Electronic Supplementary Material

Surface orientation in touch is inferred from posture, function and sensory history

Supplementary Note 1: Tactile acuity does not predict surface orientation assignment

To assess whether differences in tactile acuity across hand regions could account for the pattern of results in Experiments 1 and 2, we measured spatial acuity at the fingertip and palm using a kinetic tactile Landolt C task [1]. The stimulus was identical in motion profile to that used in the main experiments (see Fig. 1B of the main text), but included a gap that could be oriented in one of four directions. Hand posture was fixed in the pronated configuration used in Experiment 1. Participants were drawn from the same group as in Experiment 2.

Half of the participants received clockwise stimuli and half received counterclockwise stimuli. On 80% of trials the stimulus contained a gap at one of four possible locations; on the remaining 20% of trials no gap was present (catch trials). Participants reported the perceived location of the gap. Sensitivity to gap orientation was quantified as d' values from signal detection theory.

Tactile sensitivity at both sites was well above zero, confirming that participants could resolve the stimulus at the palm as well as the fingertip (Supplementary Fig. S1A). Critically, individual differences in sensitivity failed to predict direction consistency in either region. Affine regressions of sensitivity against proportion-consistent responses yielded no significant relationship at the fingertip ($R^2 = 0.1$, $F(1, 15) = 0.47$, $p > 0.05$) or at the palm ($R^2 = 0.3$, $F(1, 15) = 0.5$, $p > 0.05$; Supplementary Fig. S1B). Participants who resolved the gap stimulus accurately still failed to assign a consistent direction on the palm. These results indicate that near-chance palm performance in Experiment 2 reflects the absence of a stable surface orientation prior rather than an inability to detect the tactile stimulus.

References

- [1] D. Chan. An apparatus for the measurement of tactile acuity. *The American Journal of Psychology*, 77(3):489–491, 1964.

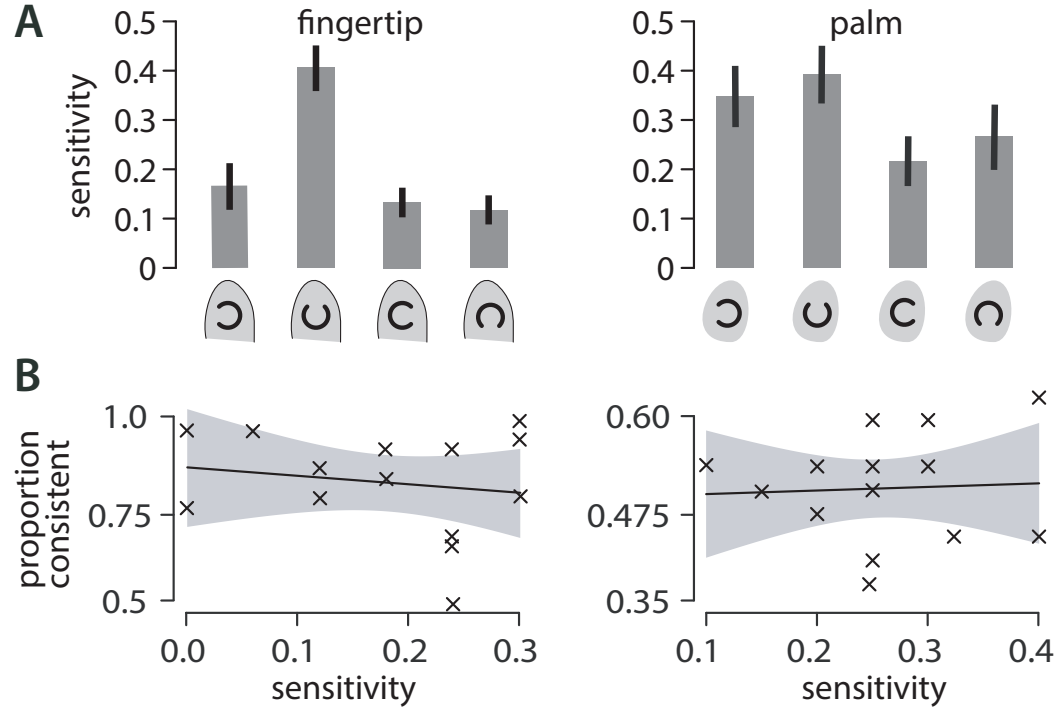


Figure S1: **Tactile acuity does not predict surface orientation assignment.** (A) Detection sensitivity (d') as a function of gap orientation at the fingertip and palm across four hand postures. Error bars indicate one standard deviation. (B) Affine regression of individual detection sensitivity against proportion-consistent direction responses, shown separately for fingertip (left) and palm (right). Shaded regions indicate 95% confidence intervals. Neither regression approached significance, indicating that acuity differences across hand regions cannot account for the observed differences in surface orientation assignment.