Supplemental Figure S1. Comparison of angular acceleration and MTd profiles. A**.** Example mean kinematic and dynamic trajectories from one movement, toward target 5 for left arm and toward target 7 for right arm. Mean trajectories (lines) and standard deviations (shaded areas) are shown for shoulder abduction/adduction DOF across 15 repetitions to each target. **B.** Mean values of normalized intertrial variability of angular acceleration profiles (right bars) and MTd (left bars). Top plot shows values for contralesional limbs of stroke participants and the left limbs of aged and young controls; bottom plot shows values for the Ipsilesional limbs of Stroke participants and the right limbs of aged and young controls. Datapoints for individual Stroke participants (dark grey bars) are color coded by subject, while datapoints for individual aged participants (blue bars) and young participants (light grey bars) are shown as white circles. Normalized intertrial variability was calculated by dividing the intertrial variability for each trial type for each subject by the peak-to-peak mean for each trial type for each subject. These were then averaged across movement directions and DOF, and then plotted for each subject in each group.

Supplemental Figure S2. Center-out reaching by participants with stroke. Endpoint (hand) trajectories for individual center-out reaching movement toward each of 14 peripheral targets for all Stroke participants (S1-S8). Targets are shown for the horizontal (left) and vertical (right) plane. Ipsilesional arm trajectories are signified by a grey background, while contralesional arm trajectories are signified by a white background. Target location is identified in the top row. Triangles were used to show the end location of each trajectory. For the most impaired subject (S8), color was used for each trial type to improve visibility.

Supplemental Figure S3. Performance index for each movement direction per participant with stroke including angular acceleration and MTd. Each plot shows angular acceleration performance index (Dark and light purple lines for outward and return movements respectively) and MTd performance index (red and orange lines for outward and return movements respectively) for reaching with the contralesional arm. The outer radius in all plots is equal to 10 bits/s.

Supplemental Figure S4. Coefficient of determination (R^2) including angular acceleration and MTd. The central tendencies of data per participant are shown as means (dark circles) with standard deviation across movement directions (light bars). DOFs were averaged to show variation across each movement direction. Paired T-tests were used to compare individuals to controls, without averaging across DOF (28 movement directions for 4 DOF, n = 112). Hashtags show significant differences between angular acceleration R^2 in individuals with stroke compared to angular acceleration R^2 averaged across young controls per movement direction and DOF. Stars show significant differences between MTd R^2 in aged individuals and those with stroke compared to MTd R^2 averaged across young controls per movement direction and DOF. Significant α = 0.0031 with correction for multiple tests.

Supplemental Figure S5. Cluster analysis of the coefficient of determination based on angular acceleration and MTd. **A.** Example cluster coordinates (stars) and individual R^2 values based on angular acceleration (filled circles) for a movement toward target 3 for shoulder and elbow flexion/extension (f/e) DOFs. Only 2 DOFs for a single movement are plotted, but the cluster analysis was applied across 112 dimensions of 4 DOFs, 14 center-out, and 14 return movements. This plot is formatted like Fig. 5A. **B.** Distances between the two clusters per movement direction. Dark and light purple lines show distances between clusters of angular R^2 values for center-out and return movements respectively. Red and orange lines show distances between clusters of MTd R^2 values for center-out and return movements respectively.