SUPPLEMENTAL FIGURES

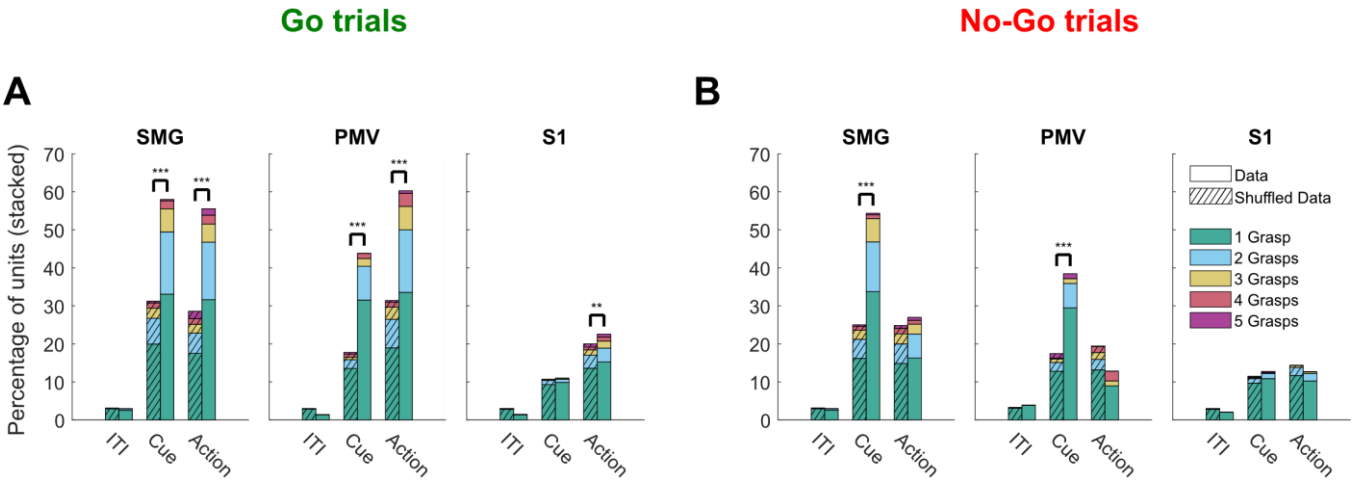

Figure S1 (related to Figure 1) | Mixed grasp encoding within the tuned neuronal population. A) Stacked percentage of units tuned to one, two, three, four and five grasps during the ITI, cue and action phases during Go trials. Cue and action phase data consisted of firing rates averaged over the cue and action phase analysis windows as denoted by gray lines on Figure 1 C,D. Significance was calculated by comparing data (right bar) to a shuffle distribution (striped bars, left bar, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$). Results were significant during the cue phase in SMG and PMv, and during the action phase for all brain areas. The majority of tuned units were selective to one grasp. In SMG and PMv, additional units were tuned to multiple grasps, demonstrating mixed grasp encoding within the population **B)** Same as A) for No-Go trials. Results were not significant during the No-Go action phase.

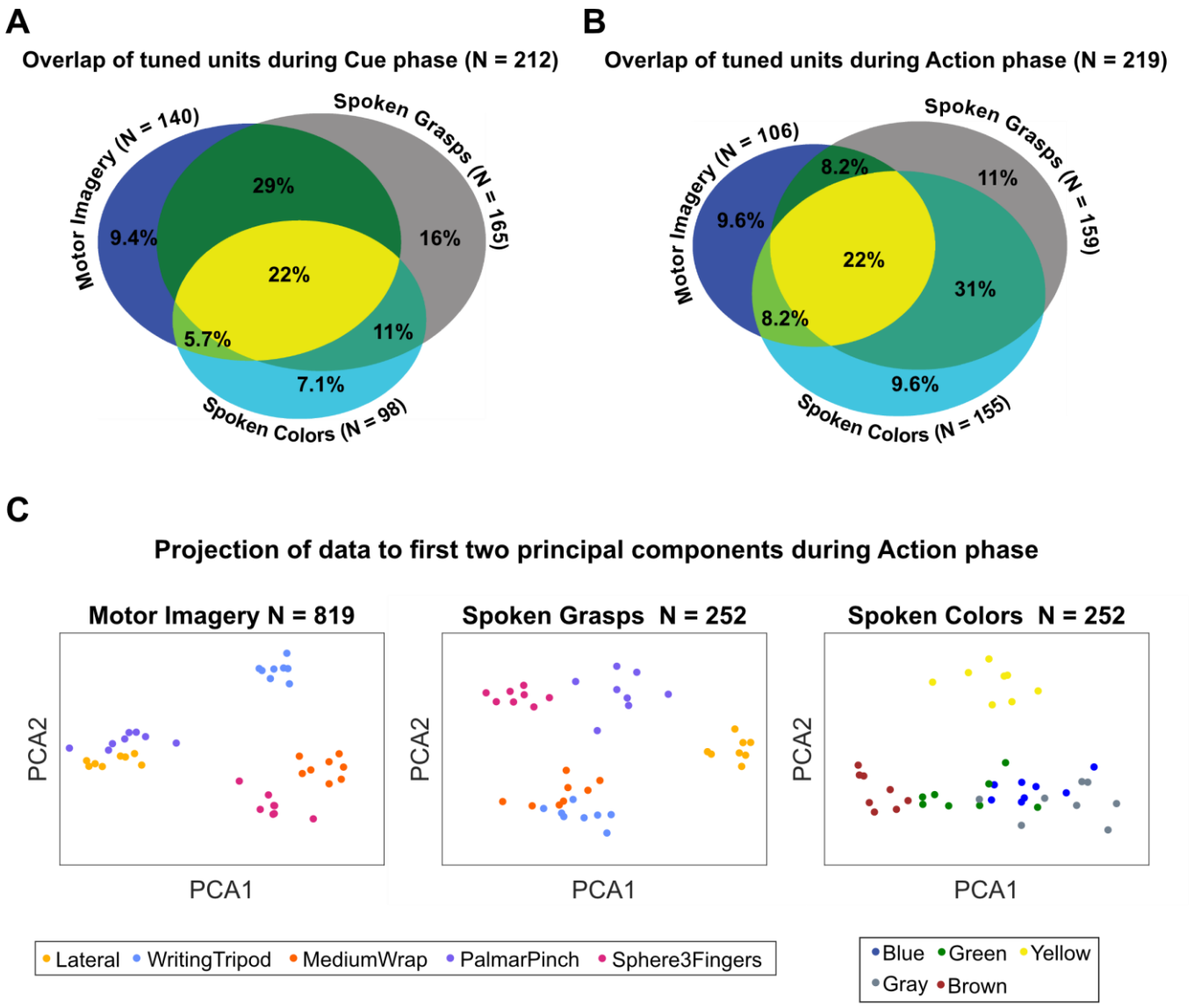

Figure S2 (related to Figure 4) | Neural representation of SMG units during motor imagery and spoken tasks. A) Overlap of units tuned to their respective task parameters during the cue phase analysis window between "Motor Imagery", "Spoken Grasps" and "Spoken Colors" task. Firing rates were averaged over the cue phase window as denoted by a gray line on Figure 4D. The overlap of units active for both the motor imagery and the spoken grasps task was notably higher (29%) compared to motor imagery and spoken colors (5.7%) and spoken colors and spoken grasps (11%). This suggests that the representation of the grasp image cue did not change much based on the engaged motor plan. **B)** Same as A) but during the action phase. Firing rates were averaged over the action phase window as denoted by a gray line on Figure 4D. Here, the overlap of units tuned both to spoken grasps and spoken colors (31%) is higher than between the grasp speech and motor imagery condition (8.2%). This suggests neuronal populations are more similarly engaged for output modality (speaking of colors and grasps) than for semantic content (grasp motor imagery and speaking of grasps). **C)** PCA of the z-scored action phase data was computed for each task. Data was projected onto the first two principal components. Clustering of task parameters (grasps for "Motor Imagery" and "Spoken Grasps", colors for "Spoken Colors") was not consistent between tasks. During motor imagery, "Lateral" and "PalmarPinch" occupy neighboring spaces. Intuitively, this could be due to a similar pinch with the thumb in these grasp shapes compared to other grasps. If similar object shape could predict related population activity, then "MediumWrap" and "WritingTripod" should have been represented in close proximity, as they both depict cylinders of different diameters. However, "MediumWrap" was closer to "Sphere3Fingers" in the PCA space. Therefore, we hypothesize that resembling hand postures are encoded in SMG's neural data during grasp imagery. During speech, the representation of the grasps in the neural space changed. The grasp name with the fewest syllables ("Lateral") was represented furthest away in this feature space. For "Spoken Colors", most words were intermixed.

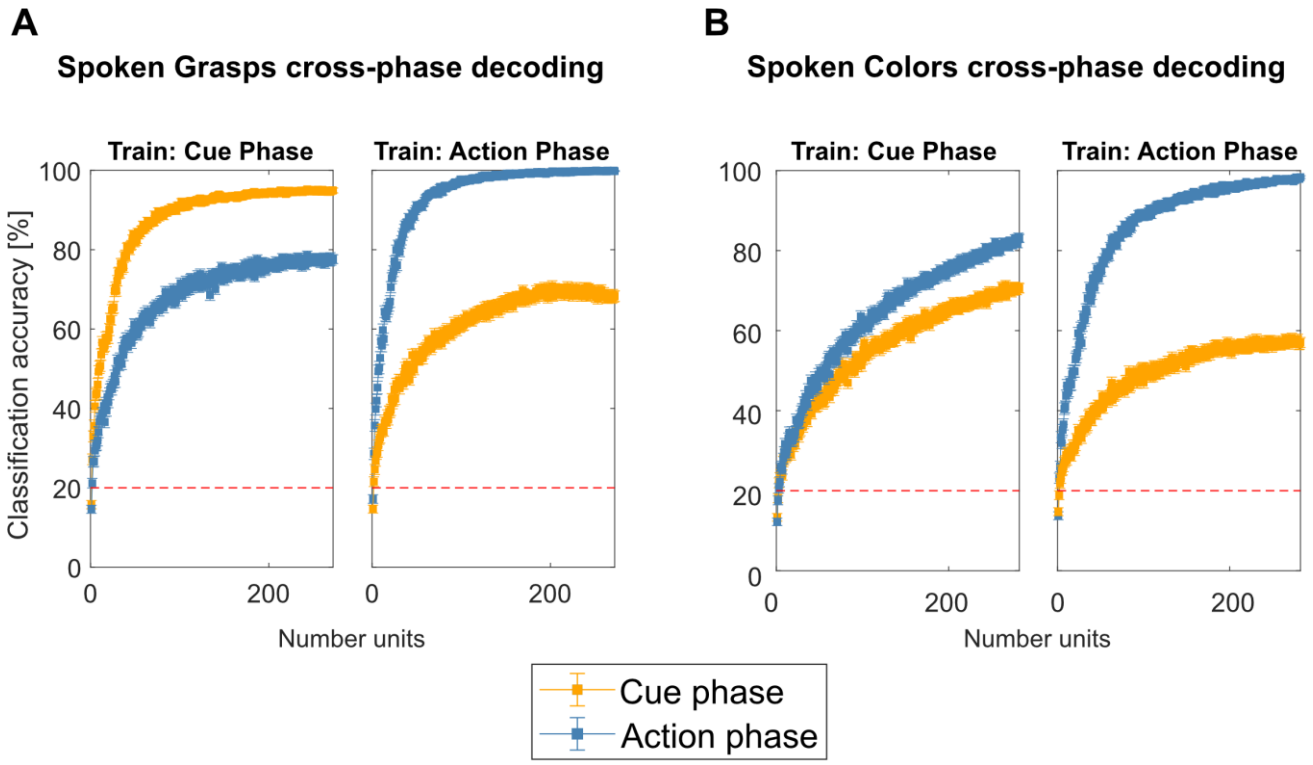

Figure S3 (related to Figure 4) | SMG shows less generalizability between the cue and action phase during spoken words than motor imagery. A) A neuron dropping curve analysis was performed on SMG activity using data from the "Spoken Grasps" task over 100 repetitions of eight-fold cross validation. To avoid overfitting, the first 20 PCs were used as features for classification. The analysis was performed once by training the model on the cue phase, and applying it to both cue and action phases (Train: Cue phase), and by training it on the action phase and applying it on both cue and action phase (Train: Action phase). The mean classification accuracy with bootstrapped 95% c.i. was plotted. Less generalization occurred between the cue and action phase during the "Spoken Grasps" task than during "Motor Imagery" task (Figure 3) **B)** Same as A), but for "Spoken Colors" task. Training on the cue phase reached a lower average classification accuracy (71%) compared to the "Motor Imagery" (93% - Figure 3A) and "Spoken Grasps" (95% - Figure S3A) tasks. This suggests color might be a less important feature than grasp images in SMG.