

Supporting Information

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SI Text

Results. A comparison between the adapted group and the combined group of nonadapted and control subjects was made by using the bootstrap sampling technique with replacement. The nonparametric bootstrap procedure provides a convenient way to generate a sampling distribution and hence to estimate population parameters from an existing dataset. The distribution is generated by resampling the perceptual shift measures multiple times with replacement, without restricting the number of times any individual perceptual shift can be included in a specific bootstrap sample. Fig. S1 shows histograms of the mean perceptual shift for 2,000 bootstrap samples of size 17 (for the adapted group) and 2,000 samples of size 27 for the combined control and nonadapted subjects. Note that the sample sizes for the bootstrap procedure match the number of individuals in the adapted and combined groups respectively. Here, a rightward perceptual shift among the adapted group subjects is clearly evident. On average the mean perceptual shift for the adapted and combined groups differs by 6.8%.

Methods. Experimental Setup. A computer-controlled robotic device (omega.3; Force Dimension) was used to deliver a mechanical load to the lower jaw. The robotic device was connected to a custom-made acrylic-metal dental appliance by using a magnesium-titanium rotary connector that provided fully unconstrained movement of the jaw in the absence of external load. The dental appliance was attached to the buccal surface of the mandibular teeth with a dental adhesive (Iso-Dent; Ellman International). A force/torque sensor (ATI Nano-17; ATI In-

dustrial Automation) was mounted at the tip of the robotic device to measure the resistive force applied by the subjects in opposition to the load. The subject's head was restrained during the experiment by connecting a second dental appliance that was glued to the maxillary teeth to an external frame that consisted of a set of articulated metal arms. The metal arms were locked in place throughout the experimental session.

Experimental Procedures. For both the experimental group and the control group, the experiment was divided into two separate sessions. The first day involved a familiarization session without the force-field training phase and was similar for all subjects. On that day, subjects completed the auditory identification task twice, followed by the word-reading task and then another auditory-identification task. The actual experimental manipulation was conducted when subjects came to the lab for the second session. The training day was included in the design to give subjects experience with the perceptual test. Perceptual judgments are often quite variable early in training and the slope of the psychometric function is relatively shallow. The slope increases over the course of these initial tests and by the end of the training day it reaches a value that is more or less maintained thereafter. We verified that the performance of subjects that would ultimately form the experimental and control groups was equated at the end of the familiarization session. We obtained no differences between the groups in their final perceptual performance at the end of day 1 ($t_{(42)} = 0.12, P > 0.9$). Therefore, subjects' performance at the end of the familiarization day was equated.

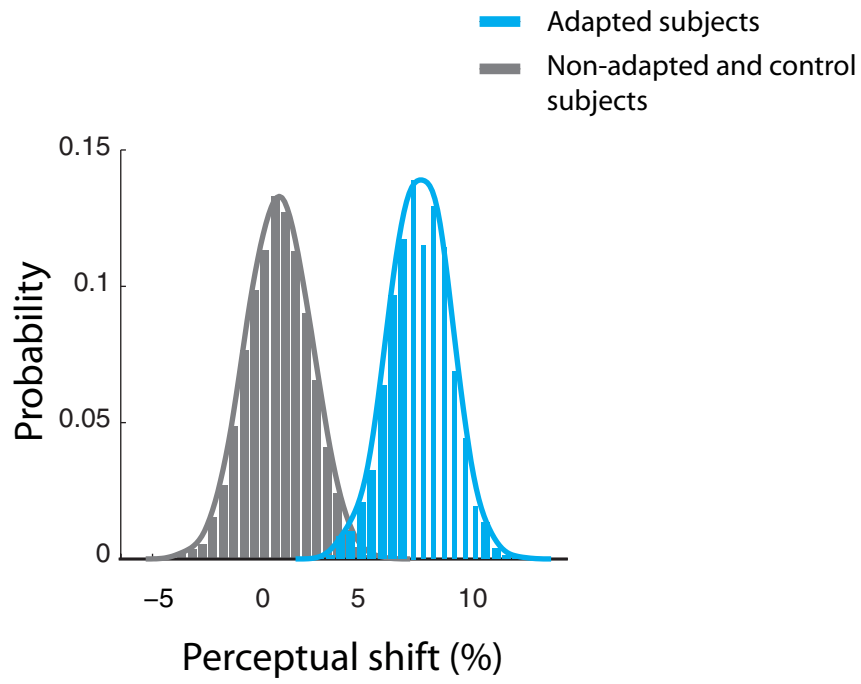


Fig. S1. Histograms giving the distribution of perceptual shifts calculated from 2,000 bootstrapped samples. The adapted (cyan) subjects have nonzero perceptual change, whereas the distribution for control and nonadapted subjects (gray) is centered on zero.