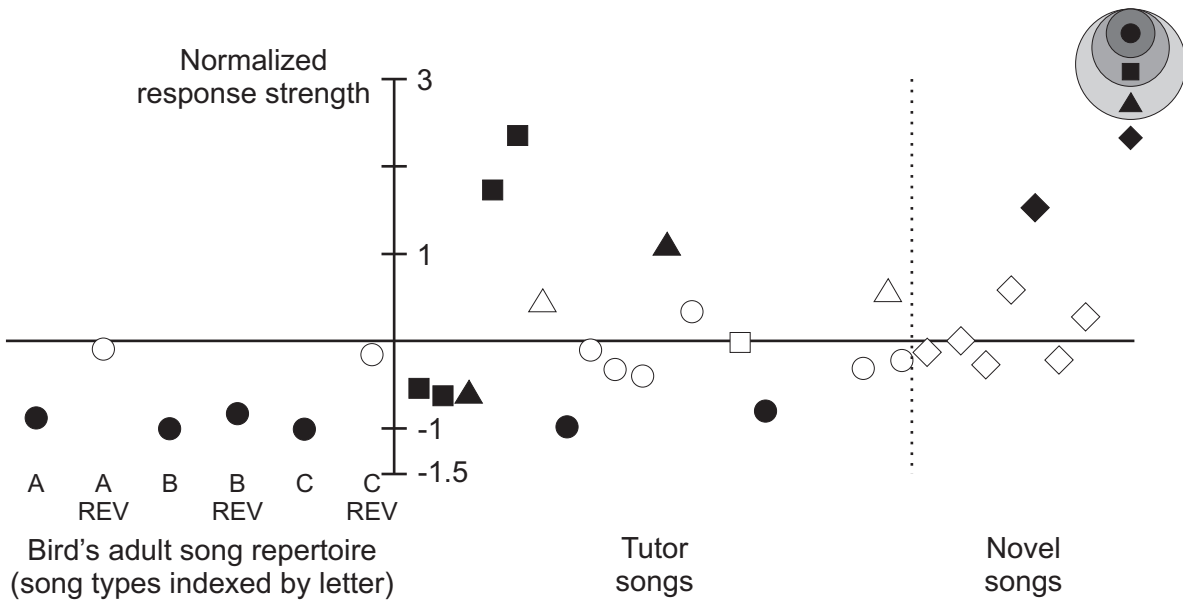
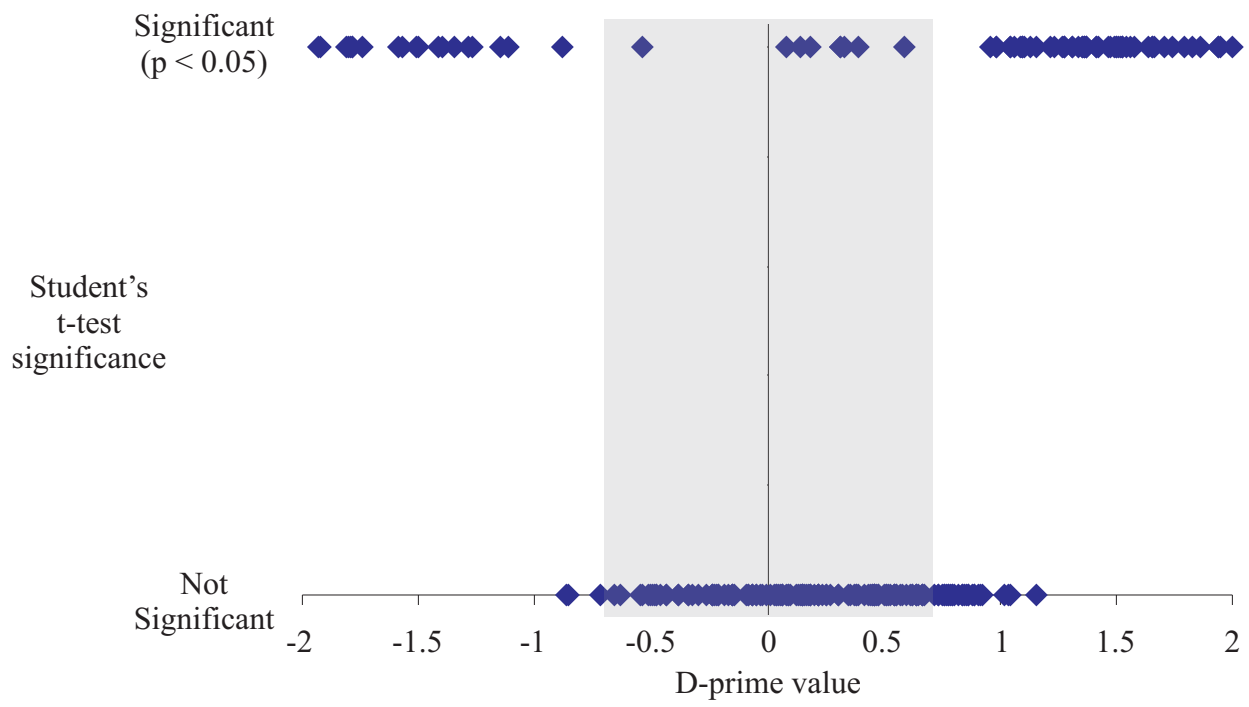


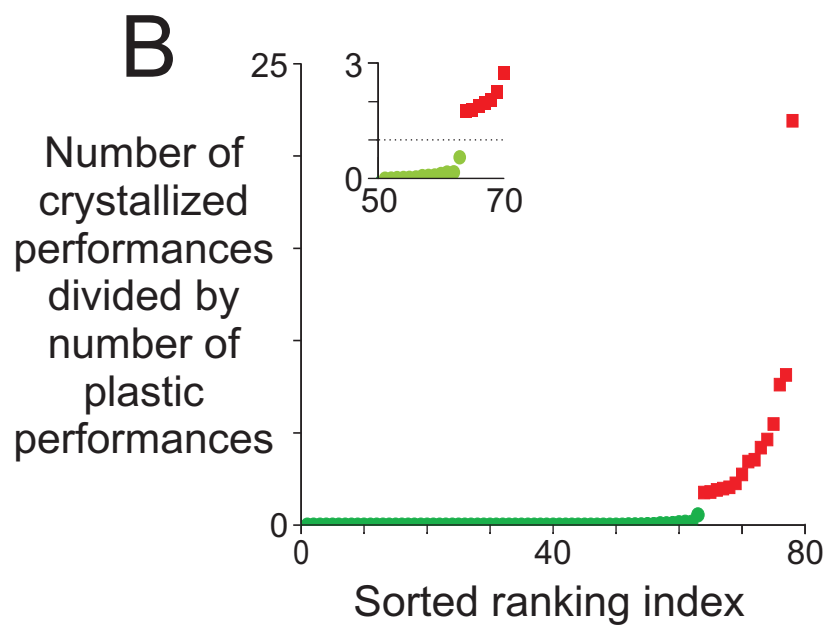
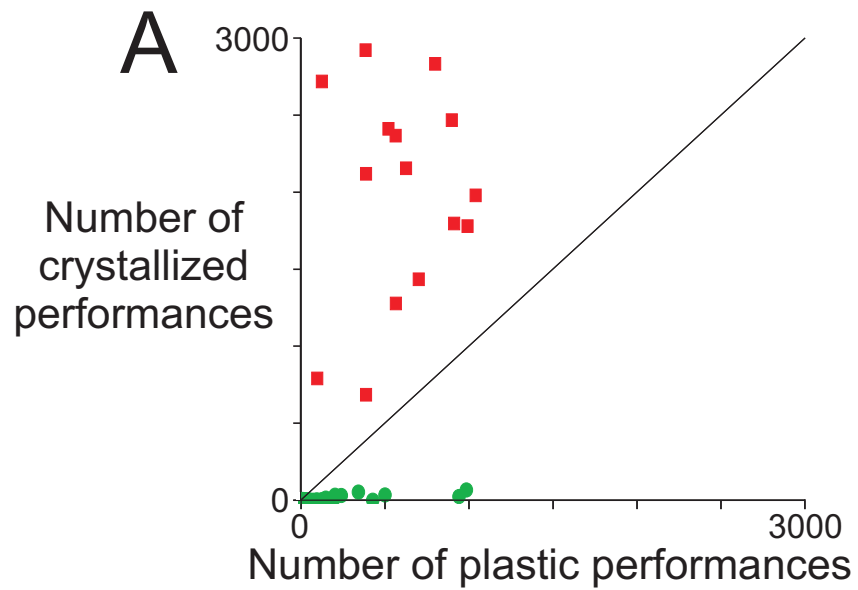
SUPPLEMENTAL FIGURE 1



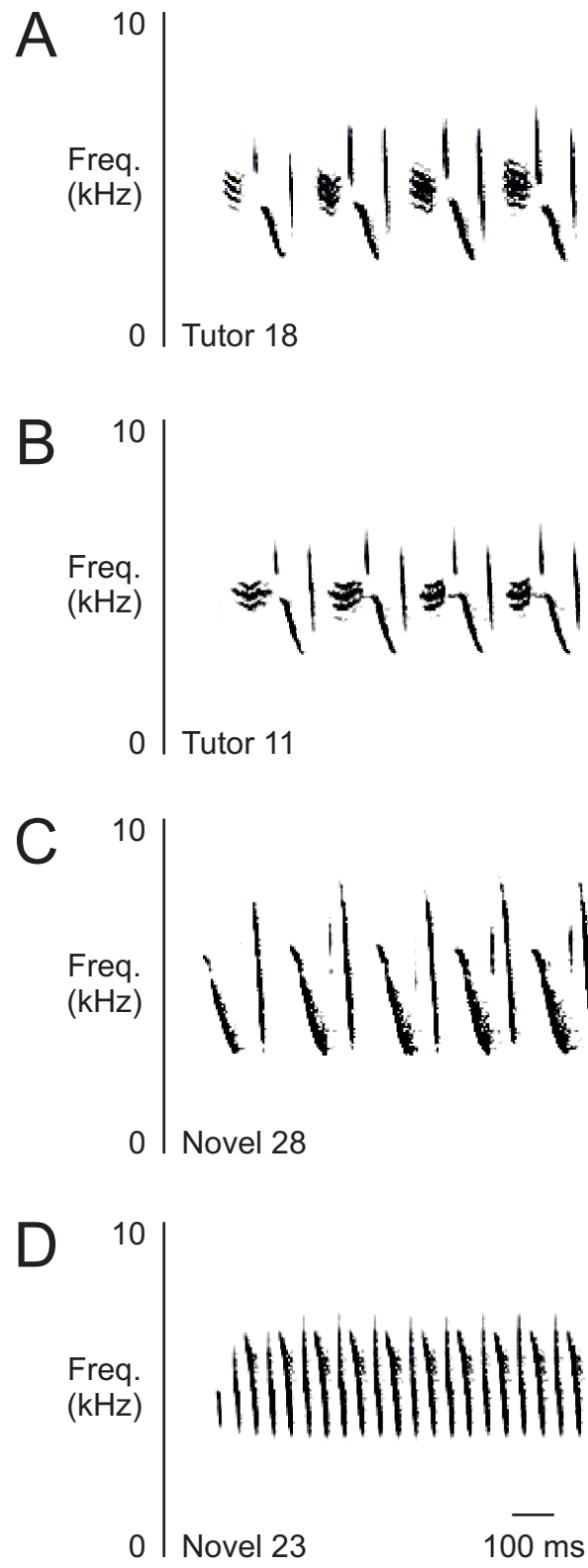
SUPPLEMENTAL FIGURE 2



SUPPLEMENTAL FIGURE 3



SUPPLEMENTAL FIGURE 4



SUPPLEMENTAL FIGURE 5

1 **SUPPLEMENTAL FIGURE LEGENDS**

2

3 **SUPPLEMENTAL FIGURE 1**

4 **Extensive song recording throughout development and adulthood documented the total set of song**
5 **types performed by each bird.**

6 Song recording for each bird began in February 2008, and the plastic song was detected 3 weeks later.
7 The period of plastic song performance lasted 6.5 ± 0.6 weeks (mean \pm SE), and each bird was sampled
8 throughout through plastic and crystallized song once per week for a continuous period of 23.6 ± 0.3
9 hours per week (number of plastic song types detected per bird: 12.8 ± 1.2 , range 9 to 18; number of
10 plastic song performances detected per bird 1822 ± 485). Recordings were continued throughout plastic
11 song and for 6.5 ± 0.3 weeks following crystallization, indicating that all of plastic song performance was
12 spanned (number of crystallized song performances detected per bird 4984 ± 718 ; description of song
13 development in Figs. 1–2). On average, sampling of 397 ± 240 plastic songs per bird was required to
14 define the total number of song types produced at any time in the birds lifetime (evident as a plateau in
15 this plot of cumulative song performance), and far more songs were sampled from each bird. These data
16 indicate that our song sampling paradigm was adequate to describe the set of song types that were ever
17 performed by each bird. Thus, it is likely that song types we failed to detect for a given bird were never
18 performed by that bird.

19

20 **SUPPLEMENTAL FIGURE 2**

21 **HVC neurons that express significant inhibitory responses to adult song types can nonetheless**
22 **express significant excitatory responses to particular tutor songs.**

23 This HVC neuron significantly decreased its activity in response to adult songs but significantly increased
24 its activity in response to certain tutor songs. All responses are normalized to the response to the
25 strongest adult song type for that cell (see text). Symbols indicate the role of the song in the bird's life
26 history as in Fig. 2D (dotted vertical line separates responses to tutor and novel songs; filled symbols:
27 significant response strengths; open symbols: responses that were not significant).

28

29 **SUPPLEMENTAL FIGURE 3**

30 **Analysis of the same dataset using Student's t-test and the d-prime metric yielded similar results.**

31 There was good agreement between the results of statistical comparisons performed using the d-prime
32 metric and Student's t-test, supporting the validity of the criterion of 0.7 as a measure of the d-prime as a
33 measure of the significance (x-axis, criterion for significance: absolute value of d-prime value > 0.7 ,
34 (Green & Swets 1966; Mooney et al 2001)) and Student's t-test (y-axis, criterion for significance: $p <$

1 0.05). Shaded region indicates absolute values of the d-prime value < 0.7 , which denote a non-significant
2 difference. Note that data are shown for only d-prime values ranging from -2 to $+2$ (data shown for 20
3 cells, 6 birds). D-prime values ranged from -5.1 to $+11.5$, but all data beyond the range of d-prime values
4 shown were cases of significant differences as assessed by the t-test. Only d-prime values near zero are
5 shown for clarity.

6

7 **SUPPLEMENTAL FIGURE 4**

8 **The number of times that a song was performed in the juvenile plastic state and the adult**
9 **crystallized state varied widely across song types and birds.**

10 **A)** Some songs were sung frequently in the plastic state but rarely or not at all in the crystallized state
11 (green circles), while other songs were sung in the plastic state and then much more frequently in the
12 crystallized state (red squares; diagonal line indicates identity). **B)** The difference in the frequency of
13 performance of each song type in the plastic and crystallized states can be summarized as the ratio of (N
14 times sung in crystallized state) / (N times sung in plastic state). This ratio is zero for songs sung
15 exclusively in the plastic state (N = 51 songs, 6 birds), less than 1 for songs sung predominantly as plastic
16 songs (N = 11 songs, 5 birds), and greater than 1 for songs sung predominantly as crystallized songs (N =
17 15 songs, 6 birds). The inset shows that very few cases had ratios near one (dotted line), with all but one
18 song having a ratio of less than 0.5 or greater than 2.

19

20 **SUPPLEMENTAL FIGURE 5**

21 **Tutor and novel song stimuli spanned a wide range of acoustic features.**

22 A phenogram of song stimuli used in these experiments (Fig. 4E) revealed songs that were similar in their
23 spectrotemporal structure and that were very near one another in the phenogram (**A, B**) and other songs
24 with very different spectrotemporal structure that were very distant on the phenogram (**C,D**).

25