ASAS Report2

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We know barn owl is an effective nocturnal hunter because they can clearly identify where the sounds come from because they localize by making saccadic head-turns towards the sound emitting source. The authors mentioned that owls use two methods to identify horizontal and vertical sound directions. Interaural time difference (ITD) is used to the amplitude of the azimuthal head-turn (horizon) and Interaural level differences (ILDs) is used to elevational sound localization (vertical). The authors also motions since facial ruff of the owl influence ITDs, ILDs and the monaural characteristics of sounds arriving at the eardrum in a direction-dependent and frequency-specific manner, so they can record of the so-called head-related transfer function (HRTFs) and convolution of any free-field sound with the appropriate HRTF for a given spatial position creates virtual acoustic stimuli (VAS).

In experiments, first they record head-turn angles at peripheral stimulus positions and use linear regression to predict azimuthal head-turns from ITD in Fig5. Figure 6 is a comparison between the elevation and turning angles of individualized HRTF and non-individualized HRTF, as well as ruff and ruffcut. From the results we can learn three key points. First is owl elevational head-turn angle maximum is -30 degree, second is owls is more difficult to recognize non-individualized HRTF. Final, facial ruff is very important to owl, if owl loses its facial hair which will loss identify vertical sound.

In figure 7 shows elevational localization related to ILDs and use R square to be performance metrics. figure7a shows owl has ability to identity less than 60-degree azimuth individualized HRTFs. Figure 7b shows owl has ability to identity less than 60-degree azimuth non-individualized HRTFs but the R square is less than individualized HRTFs, the authors is mentions individualized and non-individualized has 8.5db difference. In figure 7d shows ruffcut will make owls completely loses the ability to recognize within 60 degrees. So we know owl ruff is like human pinna.