Excuse My Fowl Language, but What the Duck are you Saying?

Luke Steiger, Eli Sobel, and Sol Taylor-Brill

Auditory parameters of juvenile mallard calls are essential for recognition by females.

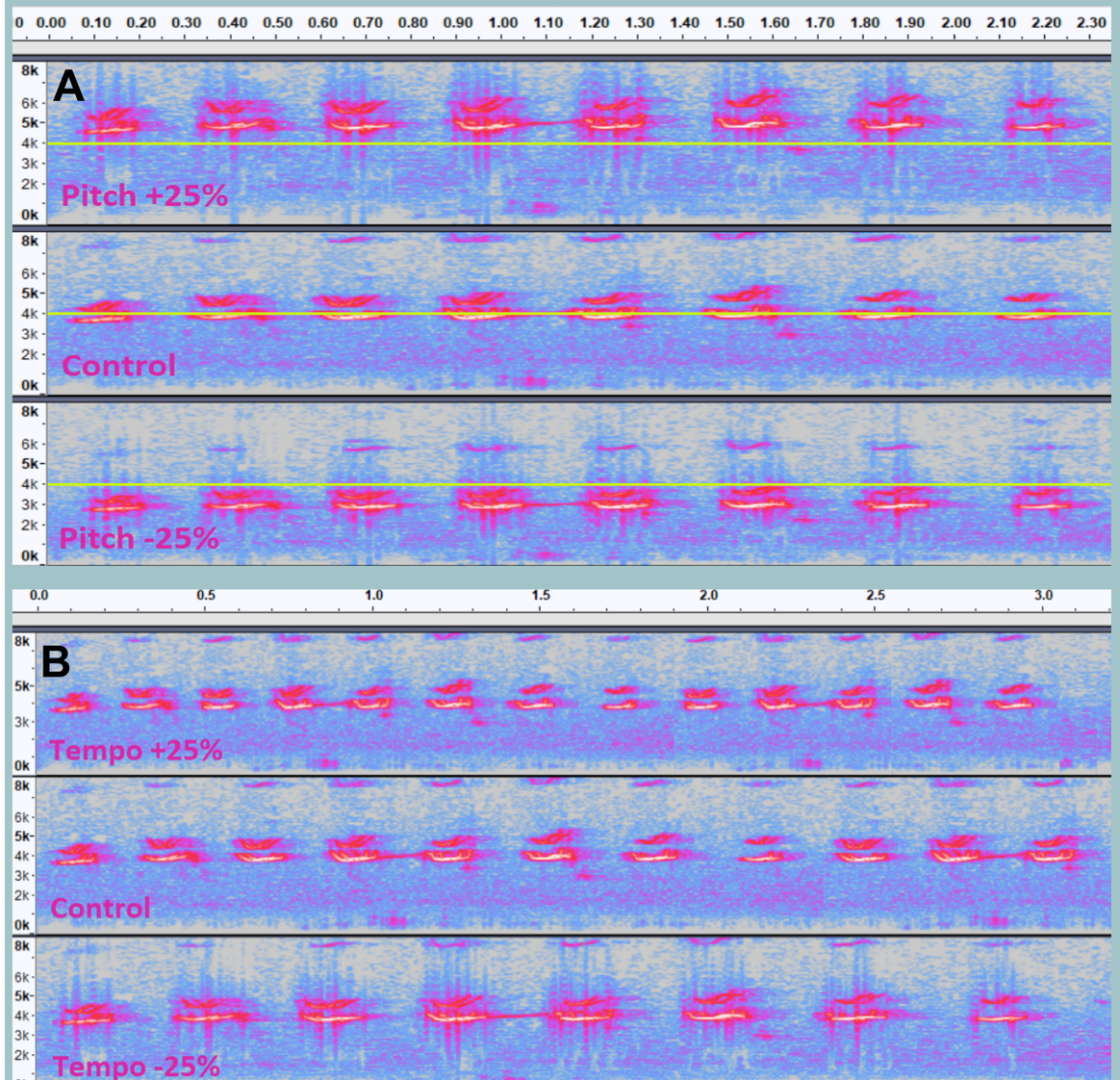
Source: Cornell Lab of Ornithology, “Mallard Identification”

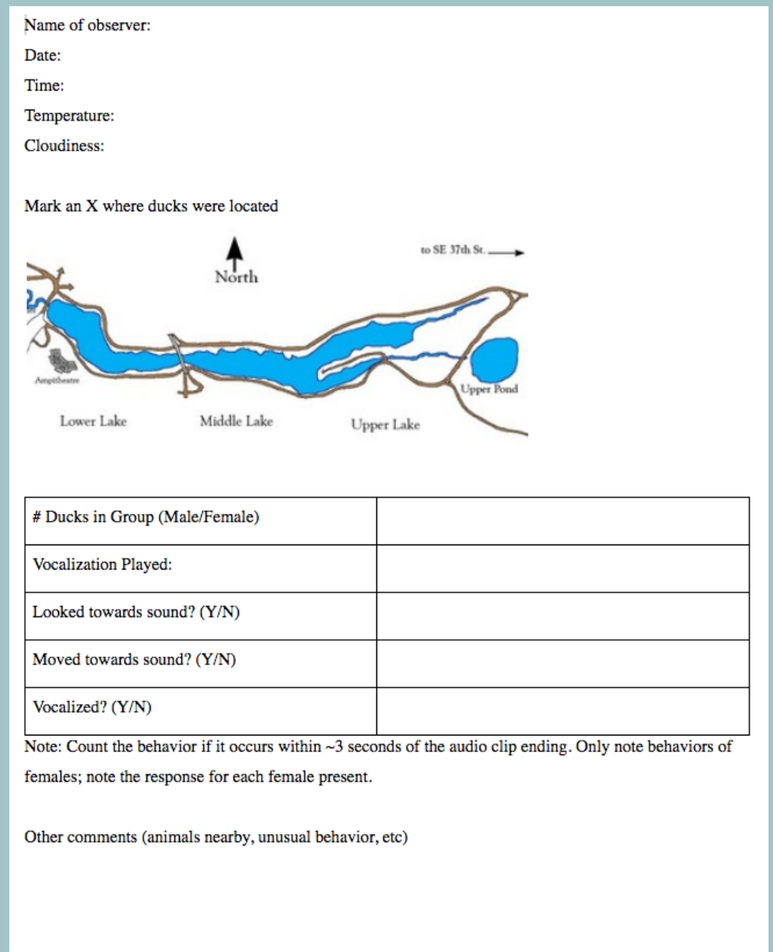
- Mallards use vocal calls for mating, parental care, and alerting others to danger. (Abraham, 1974)
- The key acoustic features that mallards require for vocal recognition are repetition rate (tempo) and pitch, both generally and in ducklings specifically. (Miller & Gottlieb, 1978) (Gaioni & Evans, 1985)

We investigated whether shifts to tempo and pitch of duckling calls affected female mallard response to calls.

Experimental Design:

- Juvenile mallard call recorded by Nick Komar was downloaded from Xeno-Canto
- Altered calls were made by either shifting the pitch or the tempo up or down using Audacity
- Call was played to groups of mallards in Reed's canyon and responses of females were recorded





Name of observer:

Date:

Time:

Temperature:

Cloudiness:

Mark an X where ducks were located

# Ducks in Group (Male/Female)	
Vocalization Played:	
Looked towards sound? (Y/N)	
Moved towards sound? (Y/N)	
Vocalized? (Y/N)	

Note: Count the behavior if it occurs within ~3 seconds of the audio clip ending. Only note behaviors of females; note the response for each female present.

Other comments (animals nearby, unusual behavior, etc)

Figure 1. Modified and unmodified duckling calls. **A** shows the pitch shifted calls next to the unmodified call, while **B** shows the tempo shifted calls next to the unmodified call.

Results:

A trend indicating Female mallards are more tolerant of some call alterations than others.

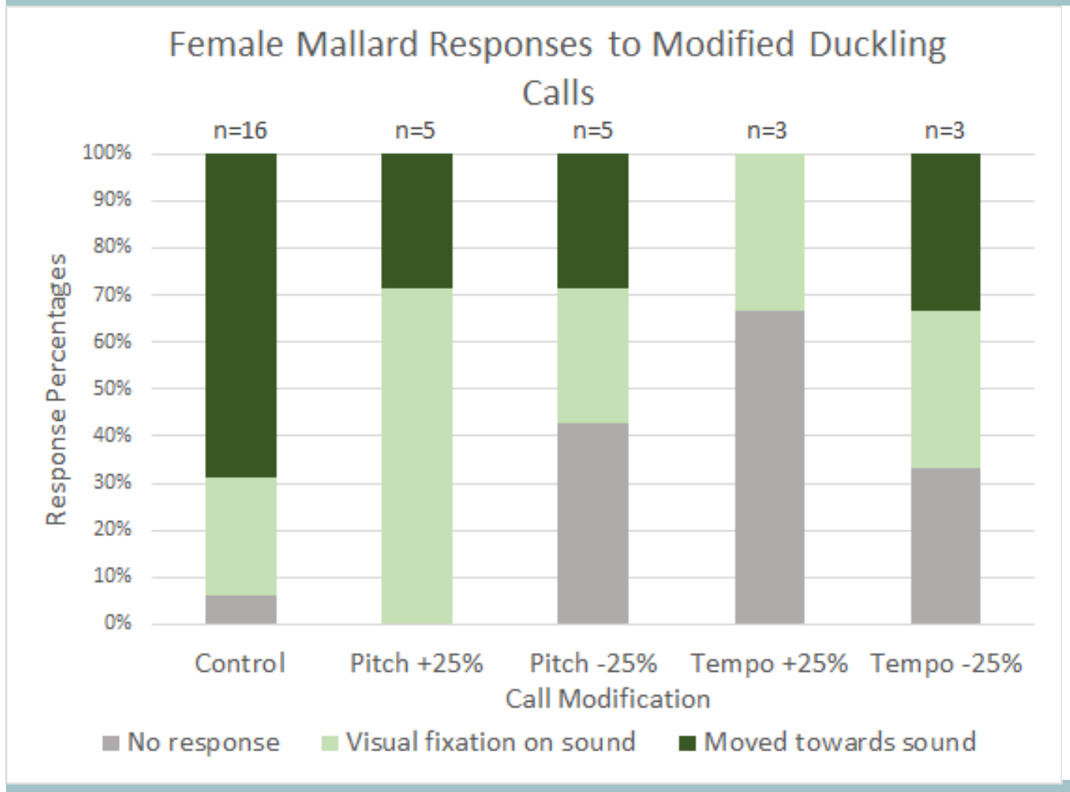


Figure 2. Responses of mallards to four different types of modified duckling calls. Measured responses were whether the ducks showed no response to the call, maintained visual focus on the source of the call or approached the source of the call.

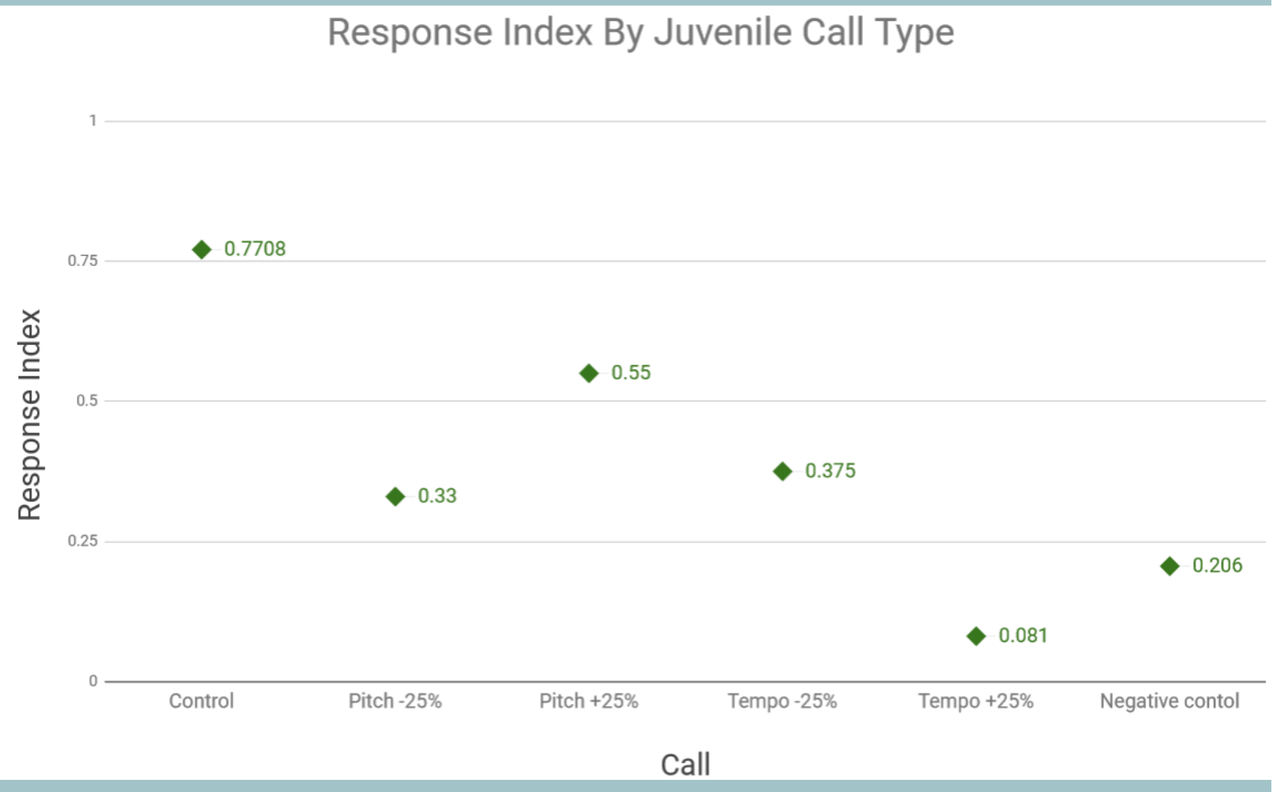


Figure 3. Response indices were calculated by weighting different responses (ie visual fixation = 0.25, approaching sound = 0.75) and normalizing for the number of observation sessions each sound was tested.

Compounding Variables:

- Seasonal distance from spring
- Individual females may not have reproduced in the past
- Tempo modification changes number of chirps over a fixed call length

We Conclude that:

- Mallards respond less frequently to altered than unaltered calls
- Mallards seem to tolerate upward shifts in frequency and downward shifts in tempo more than other alterations
- Both tempo and frequency appear to be character-defining attributes of juvenile vocalizations

Future Directions:

Further studies might investigate these trends in more detail by using a wider range of altered samples with smaller increments to better understand the exact limits of conspecific vocal recognition, and to gather statistically significant data.

References:

1. Abraham RL. Vocalizations of the Mallard (Anas platyrhynchos). *The Condor*. 1974;76(4):401. doi:10.2307/1365814.
2. Brumm, H. & Naguib, M. Environmental acoustics and the evolution of bird song. *Advances in the Study of Behavior*. 2009;40:1–33,
3. Dorado-Correa AM, Zollinger SA, Brumm H. Vocal plasticity in mallards: multiple signal changes in noise and the evolution of the Lombard effect in birds. *Journal of Avian Biology*. 2017;49(1). doi:10.1111/jav.01564.
4. Gaioni SJ, Evans CS. The role of frequency modulation in controlling the response of mallard ducklings (Anas platyrhynchos) to conspecific distress calls. *Animal Behaviour*. 1985;33(1):188-200. doi:10.1016/s0003-3472(85)80132-9.
5. Hill EM. Audiogram of the mallard duck (Anas platyrhynchos) from 16 Hz to 9 kHz. *Journal of Comparative Physiology A*. 2017;203(11):929-934.doi:10.1007/s00359-017-1204-6.
6. Miller DB, Gottlieb G. Maternal vocalizations of mallard ducks (Anas platyrhynchos). *Animal Behaviour*. 1978;26:1178-1194. doi:10.1016/0003-3472(78)90108-2.
7. Ord TJ, Stamps JA. Species Identity Cues in Animal Communication. *The American Naturalist*. 2009;174(4):585-593. doi:10.1086/605372.
8. Pietz PJ, Buhl DA. Behaviour Patterns of Mallard *Anas Platyrhynchos* Pairs and Broods in Minnesota and North Dakota. *Wildfowl*. 1999;50:101-122.
9. Weir JT, Wheatcroft D. A latitudinal gradient in rates of evolution of avian syllable diversity and song length. *Proc Biol Sc*i. 2011;278(1712):1713-20.