The developmental ecology of acoustic reactions: approaches to song playbacks by male cowbirds change across their first year of life

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Summary

We examined whether captive, wild-caught juvenile male cowbirds (Molothrus ater) would react to playbacks of vocalizations of conspecifics and heterospecifics and if so, whether those reactions would vary across development. We played five different types of vocalizations to juveniles: adult male cowbird song, adult female cowbird chatter, juvenile male cowbird plastic song, songs from species that are common cowbird hosts, and songs of species that cowbirds do not parasitize. We played the vocalizations to different groups of juvenile males at four times during their first year of life (summer, autumn, winter, and spring). Juveniles approached the playback speaker in response to broadcasts of specific vocalizations, but these responses differed across the seasons. Early in summer, young males approached the speaker more often when adult conspecific vocalizations were played. In the autumn, subjects approached the speaker more often during broadcasts of juvenile cowbird plastic song. In the winter, juveniles approached conspecific and heterospecific vocalizations equally. In the spring, they once again approached adult conspecific vocalizations more than any others. Also, only in the spring, the time subjects spent near the speaker during the male cowbird song playbacks was positively related to the song’s attractiveness to females (its ability to elicit copulation solicitation displays from females). These responses suggest that song reactivity may serve several functions across development, including species recognition, song learning, and group organization.

Keywords: brown-headed cowbird, development, playback, species recognition, song learning, social organization.

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1. Introduction

Development is a progression through a reliably ordered series of environments or niches (Alberts, 2008). These niches can be highly variable and can impose differing demands on the organism. The development of adaptive behaviour is most often considered to be a process by which the mature, organized adult behavioural repertoire emerges from immature, disorganized juvenile behaviour; a process that allows an organism to be able to act effectively in the environment experienced in adulthood. In order for the organism to reach adulthood, however, the developmental process must also organize behaviour such that the organism can act effectively in each of the myriad ecologies experienced during ontogeny (Adolph, 1957; Galef, 1981; Lickliter, 2000; West et al., 2003; Alberts, 2008).

The social environment can be highly variable during ontogeny and, thus, can pose multiple challenges and opportunities for learning. The social needs of developing organisms can vary across time: they may need to attend to others to find food, or avoid predators at one stage of development, to learn communicative skills at another stage, and to find mates and compete with rivals at yet another stage. Navigating these social contexts and acting appropriately within each one is a necessary part of effective development. How the individual transitions through these contexts, however, is rarely investigated.

In songbirds, song is central to the communication system and, thus, song can be used to navigate social environments in a variety of ways. Song is used to defend territories, discriminate neighbours from strangers, locate conspecifics, choose mates, regulate flock movements, and identify group mates (Emlen, 1972; Baker, 1975; Beecher, 1982; Searcy & Yasukawa, 1996; Beecher et al., 2000). The form, function and use of song can vary seasonally, geographically, and by age of the singers (Brenowitz, 2004; Hahn et al., 2009; Kirschel et al., 2009). Since juveniles can use song for different purposes during development (for example, species recognition early in life, intrasexual competition later), it is possible that perception, attention and reactions to song can vary across development (e.g., Hollen & Radford, 2009).

Brown-headed cowbirds (*Molothrus ater*) are gregarious songbirds that show pronounced attentiveness to social and acoustic stimuli (White, 2010). Cowbirds’ social and song development is distinct from the development of many other songbirds because cowbirds are brood parasites. Thus, in their