

## REVIEW ARTICLE

# Cognitive Ethology of genus *Argya* in the Indian Sub-continent: A Comprehensive Review

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### ABSTRACT

After a recent taxonomic revision of the Family Leiotrichidae, seven species belonging to genus *Argya* are now reported in the Indian sub-continent. These are omnivorous birds, mostly cooperative breeders found in groups. *Argya striata* and *Argya malcolmi* are reported to feed on harmful pests in agro-ecosystems, thus regarded as effective bio-control agents. The literature available on these species varies considerably. To understand the ecology and role of any species in the ecosystem, its ethological studies are imperative. However, little to no behaviour research has been conducted on most of these seven species. This review reveals the gaps in research done till date, the nature of study and methodology used by the behaviour scientists till date. For the conservation management and welfare of babblers and the agro-economy of the nation as a whole, a thorough research of the species' complete behavioural repertoire is required. *A. longirostris* is categorised as vulnerable species and to sustain it, we need data on its behaviour for predictive behaviour modelling.

**Keywords:** *Argya*, Babblers, Behaviour, Ethology, Software

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### INTRODUCTION

The largest order of birds, Passeriformes, includes the real perching birds, often known as passerines, which have four toes - three facing forward and one facing backward. The babblers are oscine passerine birds with a wide species-specific range in body size (6-156g), bill shape, plumage colour, vocalisation, social cognition and ecology [1][2]. There are 452 reported species divided into 5 groups [3]. With 125 species, the family Leiotrichidae is the largest clade of babblers in terms of species diversity [4]. The Great Sunda area, most of southern Asia and Africa are home to members of this family. The Sino-Himalayan and south-east Asian regions have the greatest diversity of Leiotrichidae species. The family includes species from the genera *Grammatoptila*, *Garrulax* and *Trochalopteran* that are referred to as laughing thrushes due to their loud sounds in big social groups and drab chattering savannah species from the genera *Turdoides* and *Argya* [4]. Seven species of babblers that have been identified in the Indian sub-continent.(Table 1)

**Table 1: Species of genus *Argya* found in the Indian Sub-continent.**

Sr. no	IUCN Name	Common Name	Conservation Status	Year of Status Update
1.	<i>Argya affinis</i>	Yellow Billed Babbler	Least Concern	2016
2.	<i>Argya caudata</i>	Common Babbler	Least Concern	2018
3.	<i>Argya earlei</i>	Striated Babbler	Least Concern	2018
4.	<i>Argya longirostris</i>	Slender-billed Babbler	Vulnerable	2016
5.	<i>Argya malcolmi</i>	Large Grey Babbler	Least Concern	2016
6.	<i>Argya striata</i>	Jungle Babbler	Least Concern	2016
7.	<i>Argya subrufa</i>	Rufous Babbler	Least Concern	2016

### **1. *Argya affinis* (Yellow-billed Babbler)**

Formerly known as *Turdoides affinis*, they have a distinctive appearance with a white head and neck, while the rest of the body is a warm brown color. They have a long, curved yellow bill, hence this name. The eyes are reddish-brown and the legs are pale gray. This species is native to the Indian subcontinent, specifically found in parts of India, Nepal and Bangladesh. They inhabit scrublands, grasslands, open forests, and agricultural areas [5].

### **2. *Argya caudata* (Common Babbler)**

They have a distinct black-and-white plumage pattern. The head, neck, breast and upper parts are black, while the belly, vent and under tail coverts are white. They have a long, slightly curved bill and their eyes are pale yellow or white. The Common Babbler is found in Afghanistan, India, Iran, Iraq, Nepal and Pakistan. They inhabit savannas, woodlands and scrublands [6].

### **3. *Argya earlei* (Striated Babbler)**

They have a distinct appearance with a creamy white or light gray throat and chest, contrasting with the brownish upper parts and blackish-brown streaks on the throat. It has a prominent white eyebrow stripe above the eye, giving it a distinctive look. The bill is dark and the legs are pale. This is a resident species of Southeast Asia, specifically in countries such as Bangladesh, India, Myanmar, Nepal and Pakistan. It inhabits various types of forests, including evergreen forests, deciduous forests and scrublands [7].

### **4. *Argya longirostris* (Slender-billed Babbler)**

Formerly known as *Chatarrhaea longirostris*, this species has a distinct appearance with a white head, nape and throat. The dorsal parts are brown and the under parts are pale yellowish-buff. It has a long, slender bill, which is darker in color. The eyes are reddish-brown and the legs are pale. This species is found in Southeast Asia, particularly in countries such as Bangladesh, India and Nepal. It inhabits various types of forests, including evergreen forests, secondary forests and bamboo thickets [8].

### **5. *Argya malcolmi* (Large Grey Babbler)**

Formerly known as *Turdoides malcolmi*, the Large Grey Babblers have predominantly grey plumage, a long tail. The bill is stout and slightly curved [9]. These are medium-sized birds. This species is found in India, Nepal and Pakistan and inhabits a variety of habitats including scrublands, open forests, agricultural areas and urban gardens [10].

### **6. *Argya striata* (Jungle Babbler)**

Formerly known as *Turdoides striata*, birds of this species have a distinct appearance with a pale grey-brown plumage. These birds prefer dense vegetation, including thickets, scrublands and forested areas. They are adaptable and can be found in a variety of habitats ranging from urban gardens to rural areas. The Jungle Babblers are native to the Indian subcontinent, including India, Bangladesh, Sri Lanka and parts of Nepal. They are commonly found in the lowland areas and foothills of the Himalayas [11].

### **7. *Argya subrufa* (Rufous Babbler)**

These birds have a rufous or reddish-brown plumage with a paler throat and belly. The head is often darker and the bill is orange in color. This bird species is found in countries such as India, Nepal, Bhutan, Bangladesh and Sri Lanka. Within its range, it inhabits a variety of habitats, including forests, scrublands and gardens [12].

## **REVIEW OF LITERATURE**

### ***Argya affinis* (Yellow billed babbler)**

[13] reported brood parasitism by the Pied Cuckoo on *A. affinis* in a garden in Sri Lanka.

### ***Argya caudata* (Common Babbler)**

[14] studied the reproductive biology and breeding success of the Common Babbler. In another study they found the effect of touching the eggs on breeding success of Common Babbler. [15] reported the morphometric measurements, food and breeding of Common Babbler.

### ***Argya earlei* (Striated Babbler)**

No behavioural study has been reported till date.

### ***Argya longirostris* (Slender billed Babbler)**

No behavioural study has been reported till date.

### ***Argya malcolmi* (Large Grey Babbler)**

[16] described the feeding ecology of Large Grey Babbler by observing feeding behavior, feeding associations and analyzing the gut contents of adults and nestlings in Ludhiana (Punjab). The diet of adults constituted of 62 % of animal matter while the diet of young contained 93% of animal matter. They concluded that the major constituents of diet of these babblers are pests of stored grains, cucurbits and snails which are vectors of infectious diseases of livestock. [17] studied the behaviour and interactions

between the large grey babbler group members while foraging, breeding, allopreening and territorial behaviour in Pune, Maharashtra.

**Argya striata ( Jungle Babbler)**

[18] studied and analyzed five aspects of intra- group social behavior- allopreening, sentinel, leadership, play and roosting in relation to the age, sex and breeding status of different group members of the Jungle Babbler in New Delhi. They concluded that the change in play and roosting behaviour with age are related to establishment of dominance relations among birds of the year .The intra-group behavior of the jungle babbler gave resemblance to that of social mammals rather than other birds. [19] gave the factors affecting evolution of group territories in babblers (*Turdoides* species). [20] gave an account of demography of the Jungle Babbler. [20] studied the group territorial behaviour and cooperative breeding. [21] observed the regional variations in the breeding seasons by availability of nests of 4 species of babblers- Jungle Babblers, Large Grey Babbler, Common Babbler and White-headed Babbler in Delhi and Calicut. [22] reported group clashes, number game and forced mating in Jungle Babbler. [23] assessed the role of Jungle Babbler which predate on the gram pod borer *Helicoverpa armigera* infesting the pigeon pea crop and reported that it acts as bio-control agent and feeds on the larvae of the pest. [24] observed the breeding behavior and nesting of Jungle Babbler in a house courtyard in Bikaner, Rajasthan. [25] studied the food and feeding ecology of Jungle Babbler in district Jammu and Kashmir. They reported the foraging methods employed under different categories: i) hopping and gliding (closer to the ground to catch grasshoppers and crickets), (ii) lifting of leaves (flicking of leaves to reveal prey beneath them), (iii) probing (inserting beaks in curled leaves, bark and holes), (iv) peering (turning of head to one side in search for caterpillars under the leaves), (v) stationary plucking (hovering over fruit and berries). The Jungle Babblers are regarded as the nuclear species of their respective foraging area. Other species gain benefit by vigilance of Jungle Babbler and join them in mobbing the predator. A communal relationship between babblers and their feeding associates was reported. [26] assessed the group size in Jungle Babblers and found the modal value to be 5 in Pune, Maharashtra. [27] assessed the distribution of Jungle Babblers in India with the help of participation of professional and amateur ornithologists through web-based survey and later visited the sites of documentation of the bird. [4] gave a comprehensive phylogeny for laughing thrushes and allies (Aves: Leiotrichidae) and a proposal for a revised taxonomy. [28] studied the breeding and feeding behaviour of Jungle Babblers. [29] reported first instance of Jungle Babbler feeding on House Gecko. [30] studied the structural and functional complexity of vocalization in Jungle Babblers and categorized the calls produced by the signalers in variety of behavioral contexts- affiliative and agonistic. They reported that the birds were employed towards coordination of diverse social behaviors including group movement, foraging, brood-care, aggression and vigilance. [31] observed an attack of Jungle babblers on Trinket Snake in Gujarat, India. [32] reported geophagy in Jungle babblers for the first time. [33] gave an account on temporal variation in behaviour.

**Argya subrufa (Rufous Babbler)**

[34] studied the social organisation and feeding behaviour of Rufous Babbler. He reported that Rufous Babblers were found in parties of 4 on average. It establishes permanent flocks that defend territory and share roosting grounds. One nest is used at a time, and it appears that the entire flock contributes to nest construction and feeding the young. The flock forages collectively and mostly frequent the lower understory of the rainforest.

**Table 2: Behavior Research Methodology employed till date for studying Jungle Babbler (*Argya striata*)**

RESEARCHER AND YEAR	METHODOLOGY				NATURE OF STUDY
	SAMPLING METHOD	DEVICES	BEHAVIOR CODING SOFTWARE	STATISTICAL SOFTWARE	
Gaston, 1977	Unspecified	10 X 50 Binoculars	X	X	Quantitative
Gaston, 1978	Unspecified	X	X	X	Qualitative
Gaston, 1978	Unspecified	<ul style="list-style-type: none"> <li>• Plastic ring marking</li> <li>• Mist net</li> </ul>	X	X	Quantitative
Gaston, 1979	Unspecified	Unspecified	X	X	Quantitative
Kasambe and Pimptapure, 2008	Manual observation	X	X	X	Qualitative
Bharucha and Padate, 2010	<ul style="list-style-type: none"> <li>• Visual inspection</li> </ul>	Binoculars (Zeiss 10X50)	X	Unspecified	Quantitative

	<ul style="list-style-type: none"> <li>Stratified sampling</li> </ul>				
<b>Anthal and Sahi, 2013</b>	Direct observation	Binoculars (Bushnell 7X50)	X	X	Quantitative
<b>Srivastava, 2013</b>	Visual observation	X	X	X	Qualitative
<b>Gupta, 2014</b>	Visual observation	X	X	Unspecified	Quantitative
<b>Gupta and Talukdar, 2018</b>	Survey	Unspecified	X	Unspecified	Quantitative
<b>Rafay et al., 2020</b>	Unspecified	<ul style="list-style-type: none"> <li>Garmin GPS tracker</li> <li>Vernier Callipers</li> </ul>	X	Statistix (Version 8.1)	Quantitative
<b>Mukherjee and Mukherjee, 2021</b>	Visual observation	X	X	X	Qualitative
<b>Yambem et al., 2021</b>	<ul style="list-style-type: none"> <li>Focal sampling</li> <li>Ad libitum sampling</li> <li>Scan sampling [35]</li> </ul>	<ul style="list-style-type: none"> <li>Binoculars (Nikon, Monarch 7)</li> <li>Solid state recorder (Marantz PMD661 MK II)</li> <li>Super-cardioid shotgun microphone (Seinnheiser MZW66)</li> <li>Mist net</li> </ul>	X	<ul style="list-style-type: none"> <li>Raven Pro (Version 1.5)</li> <li>R (Version 4.03)</li> </ul>	Quantitative
<b>Raina and Pampaniya, 2022</b>	Visual observation	X	X	X	Qualitative
<b>Yambem and Jain, 2023</b>	<ul style="list-style-type: none"> <li>Ad libitum sampling [35]</li> <li>Instantaneous Scan sampling [35]</li> </ul>	<ul style="list-style-type: none"> <li>Binoculars (Nikon Monarch 10X50)</li> <li>Digital stopwatch (Marathon Adanac 3000)</li> <li>Light meter (Lutron LX1102)</li> </ul>	X	R (Version 4.10)	Quantitative
<b>Jena et al., 2023</b>	Unspecified	Unspecified	X	Unspecified	Quantitative

**Table 3: Behavior Research Methodology employed till date for studying *Argya malcolmi* Large Grey Babler**

RESEARCHER AND YEAR	METHODOLOGY				NATURE OF STUDY
	SAMPLING METHOD	DEVICES	BEHAVIOR CODING SOFTWARE	STATISTICAL SOFTWARE	
<b>Toor and Saini, 1986</b>	Unspecified	Binoculars (7 X 50)	X	X	Quantitative
<b>Kulkarni, 2017</b>	<ul style="list-style-type: none"> <li>Scan sampling [36]</li> <li>Focal Sampling [36]</li> </ul>	GPS device	X	RAVEN lite (Version 1.0)	Quantitative

## CONCLUSION

There is a discrepancy in the group size reported for the Jungle Babblers by different scientists. Additionally, the seven sisters analogy used to describe this bird is unclear. Only manual data has been collected for behaviours including roosting, vigilance, territoriality and maintenance, which is inadequate for precise estimations. The foraging behaviour of this species has been studied through qualitative analysis, but data has not been quantified. Several studies are purely qualitative. The use of behavior

coding softwares for easy and precise quantification of data has not been done. For the conservation, management and welfare of babblers and the agro-economy of the nation as a whole, a thorough research of the species' complete behavioural repertoire is imperative. Only two studies have been reported for the behavior of *Argya malcolmi* which do not cover all the behavioural aspects of this species. Only few studies have been done so far on the behaviour of *A. affinis*, *A. caudata* and *A. rufous* in which only one or two behavioural aspects have been covered. There is no behavioural study available on *A. longirostris* and *A. earlei* which indicates the neglect of the species. *A. longirostris* is categorised as vulnerable species and to sustain it, we need data on its behaviour for predictive behaviour modelling.

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