International Journal of Forestry & Plantation
ISSN: 2656-6176, Volume 2, Issue 1, page 1 - 6
ISSN 2656-6176
Zambrut

International Journal of Research & Review
Proceeding & Conference
Thesis & Antithesis
Novelty & Findings
Sciences; Economics & Business; Social, Politics & Humanities; Law; Engineering & Industry; Biology, Physics & Matematics; Agriculture & Agribusiness; Health, Nursing, & Medicine; Informatics, Technology & Computers; Food & Nutrition
Zambrut

# Risk-Perception and Escape-Decision in Common Bulbul (*Pychnonotus barbatus*)

## (Studied in Amani Nature Reserve, Tanzania)

**Akemien Nerioya Neri[1] & Gba B. C.[2]**

[1]Akemien Nerioya Neri & [2]Gba B. C.
[1]Forestry Research Institute (FRIN), Nigeria
[2]A.P. Leventis Ornithological Research Institute (APLORI), University of Cocody-Abidjan Ivory Coast

***Abstract:*** *Human presence has a variety of impacts on wildlife and may influence how animals assess the risk of predation but we know less about the scale of such impacts. We quantified flush distance (FD) in Pychnonotus barbatus (common bulbul) in and around Amani Reserve station and the Germany building, Tanzania. An observer approached a focal individual at a measured Spot distance (SD) and Flush Distance (FD). We observed that escape-decision in P. barbatus is influenced significantly by activity, perching height and vegetation cover. The effect of Flock size on flush distance was not significant.*

***Keywords:*** *Flush distance, Start distance, Spot distance, Risk-perception and Escape – decision.*

***Résumé:*** *laprésencehumaine a unevariétéd'impactssur la faunesauvage et peut influencer la façondont les animauxapprécientouévaluent le risque de prédation. Cependant, nous savonspeu à propos de l'ampleur de ces impacts. Nous avonsquantifié la distance de fuite (FD) chez Pychnonotusbarbatus (bulbul commun) à l'intérieuretautour de la station de la réserved'Amani et du bâtimentallemande en Tanzanie. Unobservateurapproche un individu focal depuis un distance d'observation (SD) jusqu'àune distance de fuite (FD) mesurées. Nous avonsobservéque la décision de fuite des oiseaux du genre P. barbatusestsignificativementinfluencéeparl'activité de l'individuapproché, la hauteur à laquelleil se trouve et le couvertvégétal. L'effet de la taille du groupesur la distance de fuiteétaitrelativementinsignifiant. Mots ou expressions clés : distance de fuite, distance de départ, distance d'observation, perception du risque, décision de fuite.*

***Keywords:*** *distance d'observation, distance de fuite, perception du risque and distance de départ.*

## 1. INTRODUCTION

The mere perception of risk has been documented to have significant effect on animals' fitness decisions. Since the work of Caraco *et al*., 1980 on the risk sensitivity of Juncos at two temperatures, several researchers have walked this direction in a bid to establish the conditions that force animals to switch from risk-averse to risk-prone behaviors (Stephens and Paton, 1986; Gillespie and Caraco, 1987; Wunderle *et al.*, 1987; Moore and Simm, 1989; Carter and Dill, 1990; Caraco *et al*., 1990, Strombom *et al*., 2012).

Various studies provide evidence of tradeoffs in animal behavior. For instance, Birds indulge in a variety of activities such as; preening, singing, foraging, resting, and nesting. Such Activities involve decision making (Krebs and Davies, 1995). Attached to every decision are; costs and benefits therefore, an animal's decision is constrained by its physiological (e.g.: body condition or energy reserve), psychological (e.g.: bold or shy bird) and environmental (e.g.: safe or risky, rich or poor) conditions. The interplay of these constraints, tradeoffs and fitness consequences in decision-making can be analyzed using optimality models (Krebs and Davies, 1995).

Risk sensitivity may also be affected by flock size based on the "many eyes" theory. Lima (1989) with the aid of a model pointed out that animals reduce their long term risk of predation by cooperative vigilance which influences risk sensitivity and increase the chances of survival of their companions.

Animals are very much in contact with their environment. The environment which an animal finds itself imposes some conditions that present some constraints. Within such constraints, animals are forced to make decisions in order to survive. These decisions come with costs and benefits. In this study, we are concerned about escape decisions in relation to risk perception. We have observed relative variation in the flush distance of *P. barbatus* to an approaching human and we intended to find out the factors that influence these variations in the escape decision of *P. barbatus.* The aim of this study therefore, was to determine the factors that influence flush distance of *P. barbatus.* Its distinctive objectives were to also find out the effects of activity, level of vegetation cover, perching height and flock size on the flush distance of bird (perception of risk.).

## 2. METHODOLOGY

### 2.1 Study Area

The study was carried out in Amani Nature Reserve, Tanzania, in East- Africa, in an area where there are short grasses, lawns, hedges and trees. The site is characterized by footpaths, buildings, roads and constant human activity.

### 2.2 Study Species

*Pycnonotus barbatus* is also known as common/ dark-capped/ dark-eyed/ yellow-vented / bulbul. It is an endemic resident that occurs throughout Africa. It occupies wooded or bushy habitats along forest edges, riverine habitats, deserts, forests woodland and open habitats, usually in pairs or groups of 3-4 after breeding season (Keith *et al*., 1992). (Much of its description, distribution and habit have been described in The Birds of Africa volume IV). Factors that seem to affect flush distance of *P.barbatus* were selected after a pilot observation in the field.

### 2.3 Behavioral Observations and Data collection

The Birds were observed visually with the aid of a pair of binoculars between 7:30-10:30(am) and 3:30-7:30(pm) daily. When a focal bird was sighted, its activity-type is noted before the focal observer approaches it at a measured pace of two footsteps (1m) per second until the bird flushes. The number of steps made by the focal observer before the bird takes off is recorded as the "spot distance" and the number of steps left between the observer and the bird's location at bird's escape is noted as the flush distance also known as flight initiation distance (Strombom *et al.*, 2012).The level of vegetation cover was estimated as low if bird was perched on bare ground, short grass/ lawn electricity tension wires, roof or buildings ≥1m away from trees, shrubs (because the whole site is highly vegetated and vegetation cover cannot be totally excluded around) whereas if bird is perched on a plant's surface or within the plant, vegetation cover is estimated as high. The height at which the bird was perched is

measured to the nearest 1m.Whenever there was a flock (> than one individual of the focal species within 3m) an Individual is singled out for the observation and the flock size is recorded thereafter.

**2.4 Data Analysis**

106 observations were made in total. All analysis was done with the R- statistical package (2.11.1 version). The general linear model was employed to check the effect of all measured variables on flush distance. Variables were reduced from the full factorial model by an automatic stepwise deletion until the model with the lowest AIC (Akaike's Information Criterion) was selected. The model was tested prior to reduction with a 3-way ANOVA and the multiple linear regressions were used to test for a linear relationship between flush distance and the continuous independent variables.

## 3. RESULTS

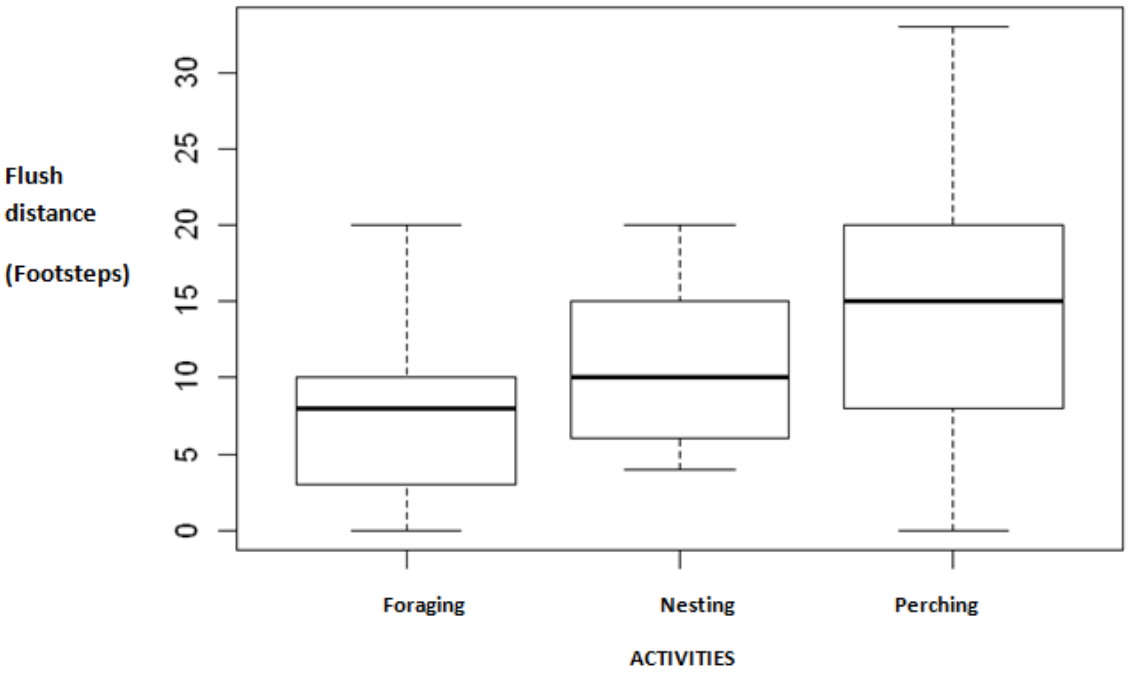


**Figure 1**: The effect of activity on flush distance (risk-sensitivity) of *P. barbatus* (P-value = $7.603e^{-10}$<0.001)
(Note: The unit of measurement for flushdistance is in footsteps; 2 steps=1m).Foraging and perching activities significantly influence flush distance of *P. barbatus*.at p-values= 0.036 and 0.003 espectively.

The above figure is a plot between flush distance and activity types: foraging, nesting and perching.The response (flush distance) of *P. barbatus* to risk in the form of an approaching human is affected significantly by activity (p-value =7.603e-10 < 0.001) and the level of this effect differs from one activity-type to the other.

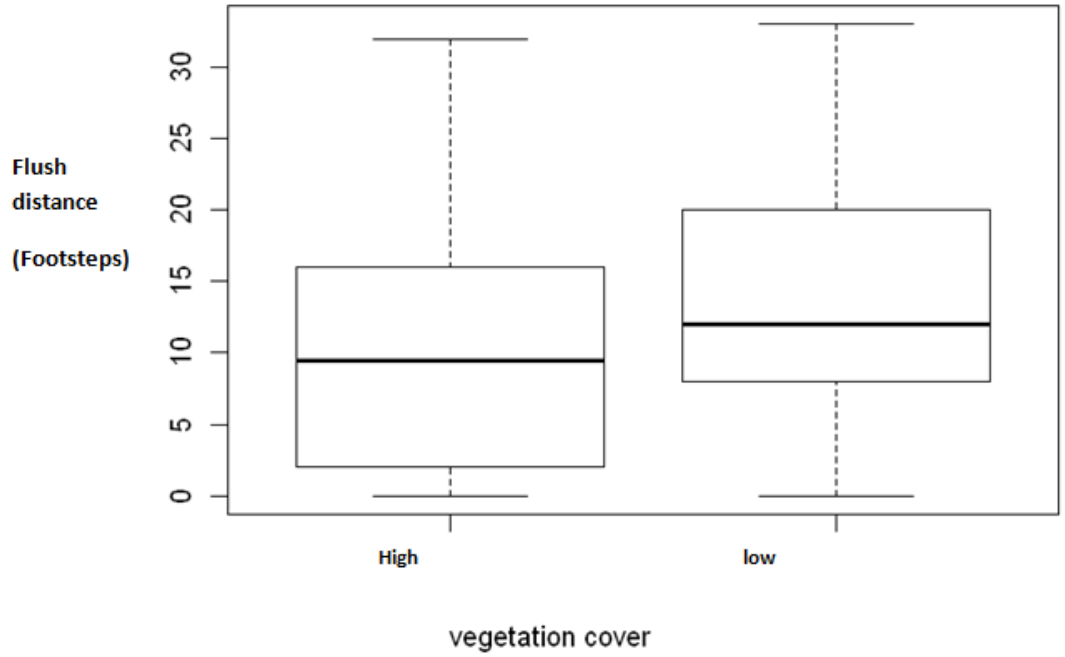


**Figure2**: The effect of Vegetation cover (at two level: high and low) on flush distance of *P. barbatus.* (Note: The unit of measurement for flushdistance is in footsteps; 2 steps=1m).

Figure 2 above, is a plot between flush distance and vegetation cover at two levels: low and high cover. The species flushed at 10.03 footsteps (approx. 5m) when vegetation cover was high (P-value=$2.14e^{-15}$) but flush distance increased by 3.9 footsteps (approx.2m) when cover was low p-value 0.02.The relationship is significant: P-value= 0.02.

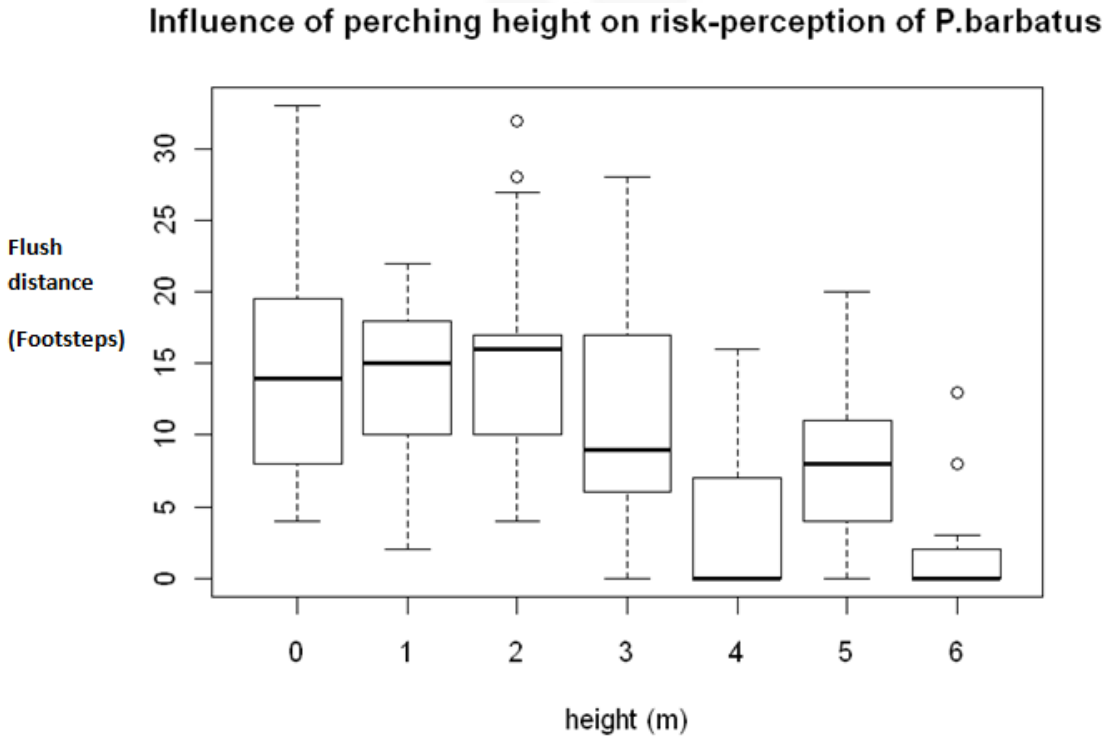


**Figure 3**: The effect of perching height on the flush distance of *P.barbatus* P-value = 1.207e-10 <0.001
(Note: The unit of measurement for flush distance is in footsteps; 2 steps=1m).

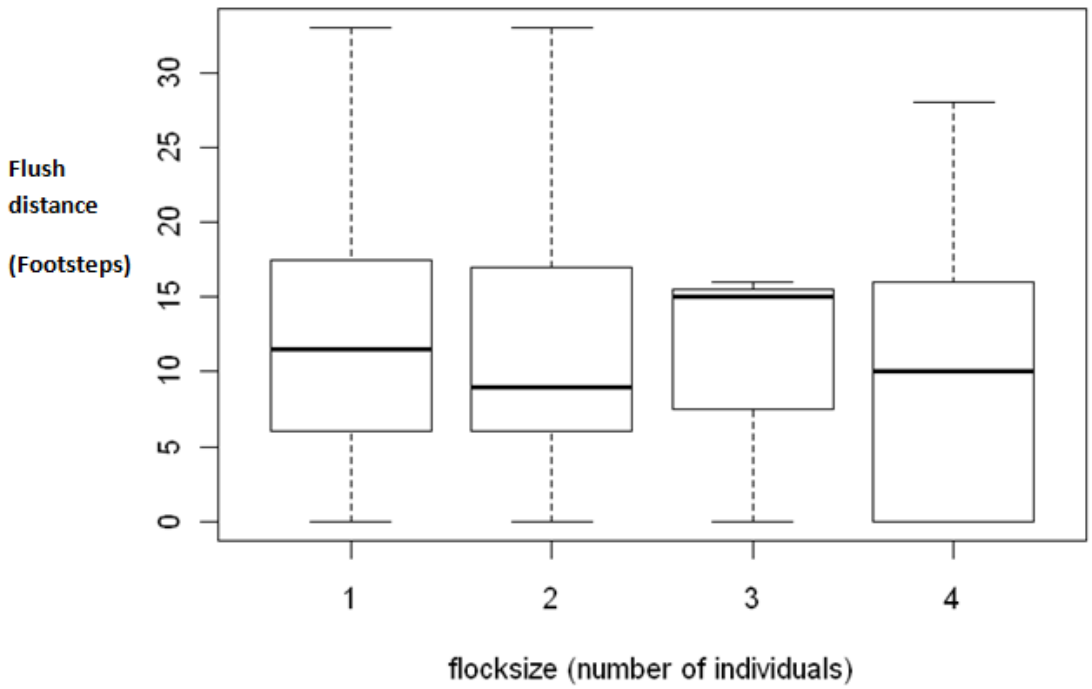


**Figure 4**: The effect of flock size on flush distance of *P. barbatus* P-value = 0.978
(Note: The unit of measurement for flushdistance is in footsteps; 2 steps=1m).

The figure above shows a weak effect of flock sizes 1, 2, 3 and 4 on flush distance of *P. barbatus* and this relationship is not statistically significant.

## 4. DISCUSSION

Several researchers have pointed out that certain factors affect the risk-perception of animals and relegate their behavior as risk-averse. Risk-perception was measured for three activity types; foraging, perching and nesting (picking materials for /building nests).When *P. barbatus* was foraging, it flushed at a distance of 7.16 footsteps (approx.4m) (P-value = 0.036) but this distance increases significantly by.10.7 footsteps (making 17.86 footsteps approx. 9m) when bird is just perched (P-value = 0.003) and insignificantly by 4.2 footsteps when bird was engaged in nesting activity (P-value= 0.512).This emphasizes the fact that an active bird is less vigilant as they may be engaged in detection/ searching of cryptic prey, pursuit of fleeing prey, selection/ handling of food or nesting material e.t.c. (Milinski, 1984; Stephens and Krebs, 1986) therefore flushes at a shorter distance than an unengaged perching bird. The poor effect of nesting activity may have resulted from the fact that data collected on nesting was very few compared to that on foraging and perching activities as only very few birds were seen nesting at time the focal observation was carried out (August).

The physical environment of organisms has great impact on their behavior (Krebs and Davies, 2001). Figure 2 is the graphical illustration of the effect of vegetation cover at two levels: low and high. Flush distance was 10.03 footsteps (approx. 5m) when bird was in high vegetation cover and this distance increased by 3.92 footsteps (approx. 2m) which adds up to 13.95 footsteps (approx. 7m) when bird was in low vegetation cover Therefore risk perception was greater when bird was in low vegetation cover than in high cover.

When bird was perched at heights of 1m and 2m above ground, flush distance increased by approx 2 footsteps but further increase in perching height steadily reduces flush distance of bird and at the height of 6m above ground flush distance was zero because birds felt safe, they refused to flush. This may be because height confers vertical distance between the bird and the approaching human, bearing in mind that humans cannot fly and the birds may be aware of this.

Birds feel safer and are less perceptive of risk when in a group. This effect is very weakly expressed in the plot (see figure 4). However the trend is obvious for flock size 1 and 2 but did not follow for flock sizes 4 and 5 probably because we had less data on observations with those flock sizes

as *P. barbatus* was in its breeding period; April-December (Keith *et al*., 1992), at the time of study (August) and birds were mostly found singly and in groups of 2. A more vigilant individual confers protection for itself and its companions but spends less time foraging. Such individual must often trade-off foraging for vigilance (Krebs and Davies, 2001) and this is very costly especially in the face of intra-specific competition. Thus the perception of risk may depend on the ratio of selfish, considerate or altruistic individuals in the group. In addition to this, flocking confers cover advantage as a result of "dilution effect" which reduces the probability that a particular individual will be picked by the predator (see Krebs and Davies, 1994).

## 5. CONCLUSION

Risk perception of *P. barbatus* is affected significantly by perching and foraging activities, perching height of bird and the level of vegetation cover. These influence the decision of P. *barbatus* to escape at different flush distance depending on the profitability (currency) of the tradeoff. Only more data can reveal the true effect of flock size and nesting activity on the risk perception of *P. barbatus*. We recommend that this study should be repeated and data collected within and after breeding season of the bird in order to equally represent the different flock size which is affected by the breeding season which restricts flock size to only two individuals. Such repeated study across seasons will also provide more data that will be effective in analyzing strongly the effect of nesting activity on the flush distance of *P. barbatus*. In addition, where possible: study should be carried out in areas where vegetation cover can be clearly distinguished as "absent and present" rather than "low and high" as this may likely produce a stronger effect of vegetation cover on the risk perception of *P. barbatus.*

## 6. REFERENCES

Zimmerman D.A., Turner D.A., Pearson D.J. (1996) Birds of Kenya and Northern Tanzania. Russel Friedman, Singapore. Pg.525

Stephens, D.W.and Krebs J.R. (1986) *Foraging Theory*. Princeton university press, Princeton. (Cited in: Krebs J.R. and Davies N.B. (1993) *Behavioral Ecology. An Evolutionary Approach*. 4th ed.University press, Cambridge).

Stevenson T and Fanshawe. J. (2006) Birds of East Africa. Christopher Helms, London. Pg 312

Strombom E.H., Price M.V., Blumstein D.T. (2012) Human Activity Modulates Mule Deer Assessment. Unpublished paper.

Keith S., urban E. k., Fry C.H. (Eds.) (1992) *The Birds of Africa*. Vol. IV. Academic press, London. Pp 375-372

Krebs J.R. and Davies N.B. (1993) *Behavioral Ecology. An Evolutionary Approach*. 3rded.University press, Cambridge.

Caraco T., Martindale s and Whittam T.S. (1980) An Empirical Demonstration of Risk-sensitive Foraging Preferences. *Animal Behav*. 28: 820-830 (sited in: Krebs J.R. and Davies N.B. (1993) *Behavioral Ecology. An Evolutionary Approach*. 3rd ed. University press, Cambridge).

Caraco T. (1987). Foraging Games in a Random Environment. In: *Foraging Behavior* (ed. A.C. Kamil, J.R. Krebs and H.R. Pulliam). Plenum Press, New York. Pp. 389-414.

Gillespie R.G. and Caraco T. (1987). Risk-sensitive Foraging Strategies of Two Spider populations. *Ecology* 68: 1227-1253

Milinski , M. (1984) A Predator's Cost of Overcoming the Confusion Effect of Swarming prey. *Animal Behav*, 32, 233-234 (sited in: Krebs J.R. and Davies N.B. (1993) *Behavioral Ecology. An Evolutionary Approach*. 3rd ed. University press, Cambridge).

**Zambrut Journal, Link Access;**
https://zambrut.com
https://zambrut.com/perception-escape/