



# Forelimb Dexterity in Carnivores

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# Research

- ▶ This research project looked to explore the connection between problem solving on a novel task with forelimb dexterity in our test subjects.
- ▶ Tested 41 species of Carnivores, 145 individuals.
- ▶ Watched videos to synthesize the data, the videos were from a prior research project done by Dr. Sarah Benson-Amram and colleagues.
- ▶ Scored the animals based upon scoring index developed by Dr. Iwaniuk from the University of Lethbridge in Canada.

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- ▶ This study focused on Carnivores due to the lack of studies on forelimb dexterity outside of primates.
  - ▶ Carnivores provide a good research subject when studying dexterity due to the wide range of social behaviors, size of the individual species, and the differences in foraging techniques and habitats.



# Scoring Index


There are three different categories that are all added together to produce one score; body, forelimb, and forepaw. Scored as 0 for not present or 1 for present, unless cases with more than one possible outcome.

## Body

- Number of different postures (one, two-three, and greater than three) Score: 0,1,2

## Forelimb

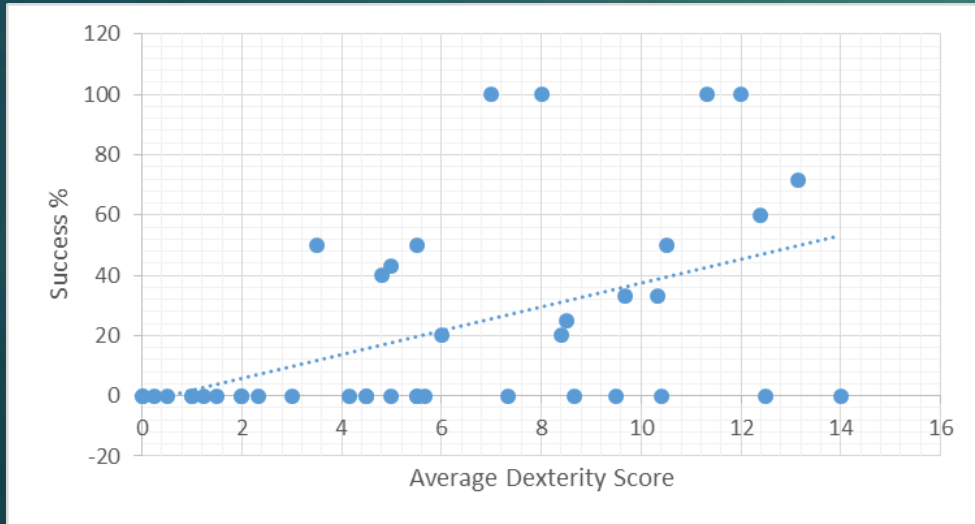
- Limb crosses midline. Score 0,1
- Alternate limb use. Score 0,1
- Upper forelimb moves in more than one plane. Score 0,1
- Upper forelimb rotation. Score 0,1
- Lower forelimb rotation; less than 90, 90-135, or greater than 135 degrees. Score 0,1,2

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- ▶ Forepaw
  - ▶ • Grasping. Score 0,1
  - ▶ • Pick up items. Score 0,1
  - ▶ • Unimanual grasping. Score 0,1
  - ▶ • Whole forepaw grasp. Score 0,1
  - ▶ • D2-D3 grasp. Score 0,1
  - ▶ • Claw grasp. Score 0,1
  - ▶ • Other grasp. Score 0,1
  - ▶ • Independent digit movement. Score 0,1
  - ▶ • Frequency of manipulation; none, up to 60%, or greater than 60%. Score 0,1,2
  - ▶ • Items swapped between forepaws. Score 0,1
  - ▶ • Items rotated by forepaws. Score 0,1
  - ▶ • Distal digits used in manipulation. Score 0,1
  - ▶ • Forepaws pull away from each other. Score 0,1
  - ▶ • Other digit/forepaw movement. Score 0,1

# Methods

- ▶ Trial length 30 min.
- ▶ I scored the individual animals based upon the Iwaniuk scoring index.
- ▶ Individuals would get an overall score of up to 20.
- ▶ Data was used to look at the correlation of forelimb dexterity to success on puzzle box.
- ▶ The trial was deemed a success if the puzzle box was opened, even if they opened it by mouth, or by force, as well as by forelimb.

# Results



Data by families	# of individuals	# successful	average score	% successful
Ursidae	13	7	10.769	53.85
Felidae	52	8	7.2307	15.38
Canidae	24	2	3.25	8.33
Mustelidae	18	6	4.3889	33.33
Procyonidae	13	5	8.462	38.46
Vivveridae	4	1	7.5	25
Herpestidae	5	0	4.6	0
Ailuridae	4	0	1.5	0
Hyaenidae	7	2	5	28.57



# Results

- ▶ The results of the study did show a link to having more success with better forelimb dexterity.
- ▶ Further examination is required to confirm the results of this study to show that animals with higher forelimb dexterity will be more successful when presented with a novel task.

# Comparison to Iwaniuk Scores

Animal	My Score	Iwaniuk Score
Ocelot	1	16
Puma/Mountain Lion	4.166	17
Coati	13.14	16
Snow Leopard	8.5	7
Fennec Fox	5.5	3
Cheetah	1.22	1
Amur Tiger	10.333	13
Leopard	7.333	13
Fishing Cat	12.5	13
Wolverine	8	8
Lion	8.4	13
Caracal	4.5	4
Sandcat	8.666	4
Spectacled Bear	14	20
Maned Wolf	7	3
Polar Bear	5.5	2
Grizzly Bear	11.333	20
Black Bear	12.4	20
Spotted Hyena	4.8	1
Dwarf Mongoose	3	4
Binturong	9.66	14

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