



## Understanding the Working Primate: An Ethogram of Jon, a Southern Pig-Tailed Macaque - *Macaca Nemestrina*

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### ABSTRACT

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A study of Southern Pig Tailed Macaque in human community was conducted in Kijal, Malaysia. The study aimed to document how this species responds to commands of performing one of the riskiest and most break-necking tasks, plucking coconut. An ethogram of *Macaca Nemestrina* was constructed by characterising and defining the behavioral patterns of this species dealing with the task given. A series of observations amounting to 28 visits with a total of 52 hours (3120 minutes) was made. There were four phases of observation conducted starting from 15 August 2019 to 3 December 2019 between 0800 and 1700 hours. It was found that the monkey is a smart animal that managed to duly perform its duty based on few rudiment utterances of sound system/vocabulary and some other repetitious forms of non-verbal communication. The ethogram of the pig-tail macaque and its coconut plucking activity is presented here for the first time.

## 1. INTRODUCTION

A working animal is an animal, usually domesticated, that is kept by humans and trained to perform tasks. People have discovered various abilities in animals and use them to do jobs, including in industrialized environment. For example, people may utilise the strength of horses, elephants and oxen in pulling carts and logs, or dogs are being used to search for drugs, explosives or missing people. Other animals including dogs and monkeys provide assistance to blind or disabled people. In the Western countries, monkeys are normally used as service animals as well as research animals. Somehow, primate research remains controversial and has been the subject of vigorous campaigning by some activists for so long. Yet many independent and expert enquiries, have concluded that there is a strong case for their use to advance scientific and medical knowledge, and in assessing the safety of new medicines. Interestingly, not many researches have been done to study how the animals, or monkeys in particular, learn to perform certain tasks as instructed by their masters, owners. There are some interesting cases of human interactions with animals that, if actually displaying direct communication,

could have amazing implications for our understanding of language and cognition in the animal kingdom. As we go along, keep in mind that the question of what constitutes communication and when that concept slips into the realm of actual language is not a simple matter. Hence, this paper discusses on how a pig-tailed macaque monkey is trained to perform coconut plucking activity in one selected farms in Malaysia. It does not elaborate the local forms of training per se but also the innate ability of trained macaque in communication with man.

There are five phases in this study. First phase was the orientation phase where monkey was taught to do certain tasks and be familiar with the verbal cues. The subjected monkey also had a schedule and learned that there were consequences if the task was not performed. The second phase was the demonstration phase. This phase was also a drilling stage where the monkey is rewarded every time the task was completed. The third phase was when the monkey was being put to test by making it climbed coconut trees at a coconut farm. Next, the fourth phase was where the monkey did the actual coconut plucking job and lastly, the fifth phase was the interview phase between the researcher and the trainer.

## 2. LITERATURE REVIEW

Roles of macaques in human life can be seen in many aspects, either in biodiversity as in their natural habitats or outside their wilderness where they become a part of the men's society. To certain extent, this primate has been worshiped as a goddess which symbolizes sacredness and purity. This literature outlines the maxim power of macaques into three domains.

### 2.1 Social and cultural importance

Beyond revealing a tight bond with men, macaques provide significantly to the biological and cultural vibrancy and the natural heritage in the geographical area where they exist. Many macaques have their own roles in ecosystem dynamics and sustainability. Some become the central figures in local and regional traditional knowledge, folklore, history, and even economics [1]. For example, throughout South and Southeast Asia, macaques are worshiped passionately in Hindu and Buddhist mythology. Hanuman, the Hindu monkey god, is one of the most feted and revered figures in Indian religion.

Today, many temples (for instance, in Bali, Bangkok and Penang) and botanical parks keep macaques as tourist sites, where they are protected, and generate an essential source of income for local populations. Macaques are treated as a part of the society and their sacredness means they cannot be mistreated.

### 2.2 Ecological importance

Some mammal species like primates can act as prey, predator or even have a mutual relationship in food chain. Prior to that, they affect the organization of ecosystem and ecological robustness.

The evolutionary process, feeding behaviour and scattered in the environment that primates live in are approximately related with the variegation of angiosperm which is a primary source of food such as pollen, nectar, fruits and seeds [2] and for living organisms [3, 4].

It can be said that numerous primates have been known for spreading pollen from plant to another plant because of their assertive harmless eating habit on flowers and nectar [3, 5]. Primates are heterotrophs that feed different parts of plant (for example, fruits, flowers, seeds, gums, and leaves). Therefore, they may influence the plant propagule dispersal which threatens tree life causing death and also spoil the reproductive contribution of some plants [5].

With the inability feature of seed dispersal by primates, plant populations can encounter decreased genetic heterogeneous and enhance genetic sub population differentiation, give negative density dependence, and decrease recruitment [6, 7].

Primate conservation is therefore crucially important to maintain intact ecosystems and the services these ecosystems provide to people.

### 2.3 Primates as model animals

Macaques are favourably worthy imitation animals as much as other primates. They give human better insight of the evolutionary history of men species and deeper understanding regarding human being manner, perception, raising children, affinity, adult participation with society, forms of social

conflict and resolution, learning and memory, and the evolution of tool use and language [8-11].

Even though the usage of primates in medical research has raised many ethical concerns that need to repute [12], scientists have gained so much knowledge regarding diseases, disorder, prevention and treatments for human. For instance, atherosclerosis, respiratory diseases, HIV/AIDS, treatment responses to psychoactive drugs, psychopathologies, societal, mental health disorders, communication, immunology, brain functioning, pharmacology, endocrine regulation of reproduction, genetics and genomics, and disease risk and parasite dynamics, among many other subjects take place from primate medical researches [12-14].

Wild primate species may carry important signs towards the origins and evolution of important infectious agents and processes mode transmission of natural disease. They act as gatekeeper for early disease detection, discovering, and monitoring, which advantage to humans. Research of these diseases in one primate population may give advantage towards protection efforts for others since emerging contagious diseases endangered both endangered and non-endangered primate species [2, 15].

### 2.4 Assisting domestic work

Traditionally coconuts have been harvested manually by people using their hands, in other words without any machinery. Notches are carved in the trunks of the trees and men scramble up. It can be dangerous work. There are records, coconut plucking activities can lead to serious health hazards. People periodically suffer concussions from getting smashed on the head with a falling coconut. Occasionally it leads to deaths.

A vendor who sells coconuts can get the average of 20 trees of coconuts to sell. Tree climbers not only harvest coconuts, they also trim the palm and clean the tree's bushy heads to prevent disease. The coconut industry would be revolutionized if a machine that picks coconuts is invented. Attempts at using long sticks have not worked out. In some parts of India, hydraulic platforms are used as machine harvesters.

It is contrast to old method where coconut tree climbing were done by boys and young men. Somehow, these day people are choosing safer, less arduous means to make a living. It contributes to the problem where coconuts are going unharvested and trees are becoming diseased.

In certain South East Asia countries, pig-tail macaques are used by coconut farmers to retrieve fruits from the crowns of tall palm trees on coconut plantations. It may be a dangerous job for a human but climbing trees is a natural behavior for a macaque. Macaques are taken from the wild as infants and raised by humans. By the age of five years, pig-tail macaques are trained to respond to verbal commands, how to choose coconuts in different phases of ripeness, and how to remove a coconut from the stem [16]. After a pig-tail macaque is trained, it receives food rewards for performing these tasks properly. An efficient macaque can harvest between 500 and 1000 coconuts per day from a coconut palm plantation. About half of a family's yearly income may be earned by the pigtail macaque retrieving the coconuts which are sold at market or used for food and a multitude of other products [17].

In some parts of Malaysia, pig-tail macaques have been trained to climb trees and pick coconuts for human masters. Known locally as beroks, they can harvest 300 or 400 coconuts in a morning. They are connected to their human handlers by

thin ropes or chains. The big males are best for picking from tall trees, where the work is hard. But the males can be difficult to manage; they are strong and have large canines. Young beroks are easier to work with but are not always as productive as the matured male beroks. The best monkeys can harvest 800 coconuts a day. Humans are sometimes faster than beroks on a single tree but monkeys have more endurance. They can sometimes leap from tree to tree. They are also not bothered as much by stinging ants, scorpions and poisonous snakes that often inhabit the top of coconut palms.

Training the beroks involves patience, persistence, punishment, rewards, mimicry and persuading the monkey that picking coconuts is somehow to his or her advantage. A bond between the trainer and monkey and an understanding of macaque body language and social interaction are necessary. On taming the monkeys, they receive affection where they are groomed, bathed and even eat together with the owner. They are considered strong, enjoying climbing, not afraid of heights, not complaining, not calling for higher wages and not corrupted. They also do not require social security and accident insurance. Monkeys are therefore considered as a 'living machine' that is very valuable for coconut farmers [18]. The coconut farmers depend on the monkeys contribution in order to earn what they would consider good money. If the monkeys are not well trained or get sick, they will not be of much help to the coconut farmers. Thus, it is very important to treat the monkeys well and provide them with a proper training so that they would be useful.

### 3. BACKGROUND OF STUDY

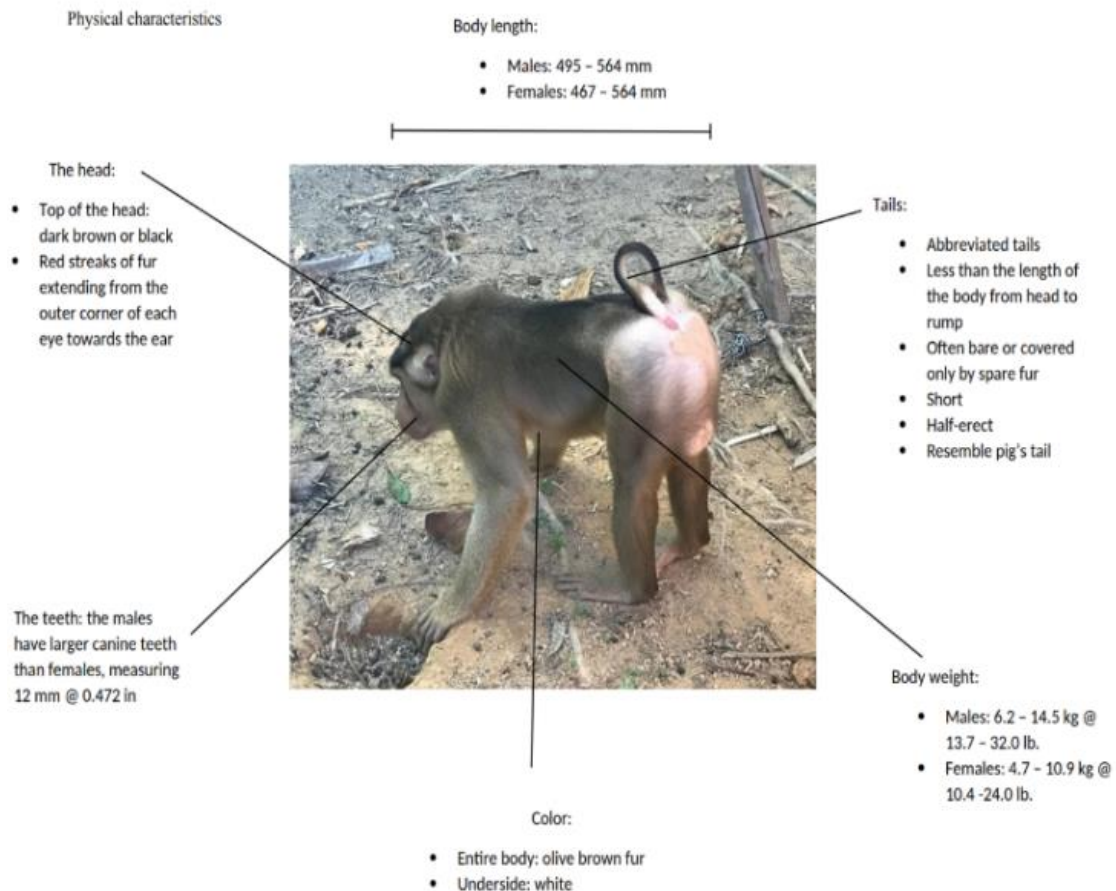
Southern pig-tail macaques are used by coconut farmers to retrieve fruits at the plantations, a natural behaviour for a macaque which human would not do. This natural behaviour is then taken advantaged by the humans by putting them to work in order to increase the number of coconuts plucked daily. A local monkey trainer may get a monkey for USD50 and the monkey is then made to pluck around 200 – 300 coconuts a day. The coconuts are processed to produce fresh coconut milk. By certain age, pig-tail macaques are trained to respond to verbal commands, how to choose coconuts in different phases of ripeness, and how to remove a coconut from the stem. An efficient macaque can harvest between 500 and 1000 coconuts per day from a coconut palm plantation.

In this paper, Jon, two years old male pig-tail monkey becomes the centre of the subject. Jon got the first training as a coconut plucker for the past seven months. Jon was bought by the present owner, Pak Hamzah, 62 years old. The later has been making a living from coconut farm since he was 17. Before, he used to climb the coconut himself but as he is getting older, he starts to use macaques to do the job. Jon is his 4th pigtail monkey that helps him at the coconut farm.

#### 3.1 Taxonomy

Other names for macaques are pig-tail macaque, Sunda pig-tail macaque, Southern pig-tail macaque, or Sundaland Pigtail macaque. Table 1 shows where various monkey families are placed in the classification of living primates.

Figure 1 illustrates a taxonomy of the southern pig-tail macaque.



**Figure 1.** A taxonomy of Southern pig-tailed macaque

Source: John E. Fa. The Genus Macaca: a review of taxonomy and evolution: June 1989

**Table 1.** The classification of living primates

<b>Suborder</b>	Haplorrhini
<b>Infraorder</b>	Simiiformes
<b>Superfamily</b>	Cercopithecoidea
<b>Family</b>	Cercopithecidae
<b>Subfamily</b>	Cercopithecinae
<b>Genus</b>	Macaca
<b>Species</b>	<i>M. nemestrina</i>

### 3.2 Location of the study

This paper highlights coconut plucking activity which is common among the Malay people in East coast of Malaysia. Southern pig-tail Macaques are commonly used and trained to pluck coconuts in most of traditional villages. The area of this study is within Kampung Bukit Anak Dara, (village) located in Kijal, Terengganu, Malaysia at Latitude 4.3274749000 (4° 19' 38.8920" N) and Longitude 103.4465258000 (103° 26' 46.1436" E).

### 3.3 Vulnerability

The order of primates is one of the most species-rich groups of mammals, surpassed only by the orders of Chiroptera and Rodentia. About 60% of primate species, including macaques are threatened with extinction because of unsustainable human activities like agriculture, logging and wood harvesting, and livestock farming and ranching. They also experience direct loss due to hunting and trapping. Primates in degraded forests face nutritional shortfalls and lower gut microbial diversity [19-21]. They also show an increased prevalence of parasites and pathogens. And finally, although empirical evidence for the impact of climate change on primates is scarce, a recent global assessment suggests that numerous primates will experience changing climatic conditions by the 21st century, with Southeast Asia is being considered hot spots of climate change that induce to the primate vulnerability [22, 23].

### 3.4 Appearance

Height: 495 to 564 mm (M), 467 to 564 mm (F).

Weight: 6.2 to 14.5 kg (M), 4.7 to 10.9 kg (F).

Males are more dominant in term of sizes. Macaca Nemestrina are buff-brown with a darker back and lighter lower parts of the body. Their common name refers to the short tail held semi-erect and reminiscent of the tail of a pig.

### 3.5 Behaviour

The monkeys reach sexual maturity at the age of 3 to 5 years. They are mainly terrestrial but also arboreal with different canopy levels. Typically live in large groups, macaques split into smaller groups during the day when they are looking for food.

### 3.6 Lifespan/longevity

They have an expected lifespan of about 26 years in the wild. Captive individuals have lived up to almost 35 years.

### 3.7 Social structure

The general social structure for macaque species is multi-male / multi-female with distinct dominance hierarchies within

each sex. Pig-tail macaques exhibit this social organization in groups of up to 81 members. Sex ratio is one adult male to three adult females. Females remain in a natal group (philopatry). Males emigrate from their natal group (4 - 6 years of age) with their peers before they reach sexual maturity. Males may migrate to other groups many times during their life. They may exist as solitary males and/or all male groups [24].

### 3.8 Ecological niche

Macaques are mostly found in rainforest up to 2000 meters, but will also enter plantations and gardens. It is found in the southern half of the Malay Peninsula (only just extending into southernmost Thailand), Borneo, Sumatra and Bangka Island. Due to deforestation, the primates are also intruding into some villages scavenging for food.

### 3.9 Communication

Macaques have a wide range of vocalisations, but they also communicate with a variety of visual signals through facial expression and body languages.

## 4. RESEARCH QUESTION

In this study, the research question is as the following:

How does a pig-tail macaque inquire commands given to him in plucking the coconuts?

## 5. METHODS

The study of animal behavior begins with a library of behaviors, called an ethogram. An ethogram is a list of species-specific behaviors describing the elements and function of each behavior. Normally, the best ethograms are functional; they are organized into categories that reflect meaningful distinctions to the animal.

The word ethogram is often used confusingly to mean two different things: The species ethogram, and the experimental ethogram. The species ethogram is a master list of all known behaviors for the species. Whereas the experimental ethogram is a distillation and reorganization of this list into the behaviors that are relevant to the hypothesis being tested. Thus, very unlike many of the automated behavioral neuroscience paradigms, where a huge number of individual variables are produced, a well-designed ethological study will narrow down the behaviors observed to exactly the right ones to test the specific research question at hand.

This study is exclusive where each behavior performed by the animal can only be categorized as one behavior. The animal can only be recorded as doing one thing at a time. This is from an exhaustive ethogram where every behavior performed by the animal has a category in the ethogram. It is normally achieved by lumping all the behaviors of no interest to the hypothesis being tested in an other category. This greatly speeds the recording of behavior, as behaviors irrelevant to the hypothesis can simply be ignored.

Experimental Standard Operating Procedures (SOPs) comprise the ethogram, and the observational method used. Again, choosing the right method is a skilled endeavor, because different observational methods have different

strengths and weakness, and are typically used to answer different kinds of hypotheses. To make these decisions easier, some commonly used experimental SOPs for particular research questions are provided on the methods and protocols page.

## 6. OBSERVATIONAL METHOD

In this study observing rules are adherent to get the data. Different rules capture different information from the same behavioral sequence, as a result deciding on the correct observing rules depends on the research question. The sampling rules involved the identified macaque in the study with the specific time. Next is attending the recording rules on how the behavior is recorded.

## 7. SAMPLING RULE

Another criterion to be adhered in this study is Ad libitum: In which a sampling method is used to record. This method is very useful for qualitative data. It is also focal means only the behavior of one animal or group of animals is recorded at a time [22, 25, 26].

Recording rules states that the act must be done continuously. This recording method keeps track of the frequencies, duration, budgets, sequences, and potentials of behaviour of the studied macaque. It is writing down the occurrence and duration of every behaviour within the visits.

## 8. STANDARD OPERATING PROCEDURE FOR LIVE RECORDING USING DIRECT OBSERVATION

This study is conducted live and a scoring sheet is used to record the behavior of the sampling. The recorded observation can be saved and sent to the email for documentation.

## 9. FINDING THE RESULTS

The finding of this study is designed based on ethogram for general behaviour of a macaque that kept in captivity and away from the wilderness. The macaque is trained to be a domestic helper in plucking coconuts at the farm.

It takes 28 visits with the total of 52 hours (3120 minutes). The animal is observed for a total of 3120 minutes from 15 August 2019 to 3 December 2019 between 8.00 a.m and 5.00 p.m. The ethogram of the Southern pig-tail macaque and its coconut plucking activity is presented here for the first time.

### 9.1 Pre-visit

Three free visits are made before the real study taking place to get the background of the research. The consent from the owner is obtained. Besides that, the visit to the den is made to see the surrounding of the habitat of the macaque that being kept in captivity. Each visit takes about an hour.

### 9.2 Phase I -Training session: Orientation

No of Visit: 9

Time allocated: Two hours for each visit

Time allocated for all sessions in Phase I by the researcher: 18 hours

Phase I would take 10 weeks with six days in each week. Approximately it takes 60 days for the orientation lesson. Jon is a male, two years plus and weights about three kilograms. The training starts around 9.00 a.m. It is a daily repetitious routine or lesson which takes about two hours everyday. The process continues. Jon is in a good temper. Pak Hamzah claims the weather also plays its role influencing the pig tail monkeys. They are more aggressive and hard to control when the weather is hot. The day starts by having a bowl of milk before the training session begins. The content of lesson is still twisting the old coconut from the pole. It takes one hour of lesson. Once the class has over, Jon would be tied to a wooden pole. There is a big tong drum attached to the wood as his dent. Lunch consists of rice and plain water would be served around 1.00 p.m. Once in a while, he would be given food and got bath.

#### Day 1 to Day 8

Jon is with the owner, Pak Hamzah. Jon is taught how to twist the old coconut. Old coconut normally is light pale brown, smaller than the ripe coconut because the skin has dried. It takes about 7 to 10 minutes to finish the task. The coconut is tied to a standing pole made of wood. For the early days of the training, Pak Hamzah would hold Jon's hand, guiding him how to twist the copper wire, which is attached to a coconut and that being tied to the pole. In this lesson, Jon needs to know what to do. The coconuts weights ranging between 1 and 1.5 kg, brownish-green, heavy to spin, and hard to bite.

Pak Hamzah would hold Jon's hand to assist the monkey for the right twist. Once Jon is able to loose the tied coconut, the process would be repeated. After twenty minutes like that, there will be a short break. The lesson continues and would take an hour the most. The coconuts are hang between two trees and tied to an apparatus for the purpose of training in stage one. Jon also shows some uneasiness with the researcher who keeps a distant from him. He opens his mouth and shows his tusks with a noise whenever he notices the researcher holding a camera towards him. Somehow, he can tolerate with the presence of the researcher on day three.

Vocabulary/command used: "ambil," (take) for every session to twist the cooper wire is going to start.

Concluding remark: The early days are to introduce Jon to a new task. As an animal that originally from wilderness, he is never being exposed to a job under certain discipline or manner. Initially, there is no special bond between the two because Jon is not a domestic pet. Somehow, he feels safe and trust the owner as a companion after certain period. The primate also senses a stranger as a threat and doesn't welcome him.

#### Day 9

The same process is conducted. Jon would know his routine without being asked. Pak Hamzah would utter the same command- "ambil" as a medium of instruction. It is as a sign to twist off the coconut from the pole. On this day, Jon starts to show some forms of aggressiveness. After the third time of doing the same task, Jon starts to hesitate doing the task. Pak Hamzah raises his voice - "ambil". Jon is still hesitated to follow the order and jeers. He opens his mouth ajar, showing his sharp tusks. Pak Hamzah needs to show he is the master. He twists Jon's left ear and grumbles. It is a sign that he is not happy with Jon's behavior. After a few minutes, Jon is under control and continues with the twisting. There is no compliment from the owner for the success. He lets Jon resting

for few minutes before continuing the task. The lesson takes about an hour.

Concluding remark: There is no justification for Jon's unwillingness to do the task. Somehow, he gets to know the rule of punishment if he disobeys the instruction. He also needs to know who is the master in the task.

### 9.3 Phase II: Training session (demonstration)

No of Visit: 5

Time allocated: Two hours for each visit

Time allocated for all sessions in Phase II by the researcher: 10 hours

Day 1 to Day 4

Phase II is a phase where the pig tail monkey would be trained to twist the ripe coconut. The ripe coconut is normally brown yellowish and bigger than the old ones. It is heavier and bigger than the old coconut, which means more energy is needed to loose the coconut from the stalk. The phase would take two weeks before the monkey is considered ready to pluck the real coconut from the farms. The training would begin at 9.00 a.m. The session takes an hour daily.

As Jon has been drilled with the twisting of the coconut, the task is not that hard for him. The cooper wire is no longer used. Instead, Pak Hamzah hangs a bunch of coconuts to a pole. Jon needs to twist the new coconut. Jon is able to finish the task within three minutes.

Pak Hamzah constructs the new command- "Tuh, tuh" (literally means that one) and "ambil" (take). After that, Jon is taught to twist the coconuts tight to the poles. There are few coconuts there compared to a single coconut to twist in the first phase. Once Jon finishes with the task, he is given few minutes break. Then the routine continues. There is not much verbal communication except the same verbal commands – "tuh itu" and "ambil" given by Pak Hamzah as a sign to do the task. The primate doesn't bother with the researcher's presence.

Concluding remark: The second stage is a drilling process. Jon knows and recognises the ripe coconut, comparing to the old coconut. He is twisting more coconuts at a certain time.

Day 5

This is the day five of the Phase II training session. Jon seems to know the task very well without much fuss. So, for every task of twisting, there are times when he is faster and performs the task in less than three minutes. Prior to that, he would be given a longer rest. There are times when the rest takes more than ten minutes. In this case, as Pak Hamzah would also rest, puffing cigarette in between. Jon just play with his fur and gets insects like weaver ants around him. He consumes the insects. The session takes more than 90 minutes.

Concluding remark: The reward is given in a form of longer break whenever Jon manages to complete the task in a shorter period.

### 9.4 Phase III- From theory to practical

No of Visit: 4

Total time allocated by the researcher: Eight hours

Time allocated for the monkey's training: 271 minutes

Day 1

This is the first day where Jon would be brought to the coconut farm. Jon has the first real coconut plucking task based on the theories and training session before. Today Jon will also learn new lessons combined with the old one: Drilling on coconut plucking.

In the first task, Jon is a bit hesitant to climb the coconut tree which is 10 feet height. Pak Hamzah pulls the string that ties Jon's neck and asks him to climb up the tree. He says the words few times and keeps moving the leash in 'U' 'U' shape movement. After few attempts, Jon climbs up the tree and once he reaches the top, he doesn't know what to do. The owner starts to give command by utterancing the sound- "tuh, itu"- means that is the right coconut and "ambil"- means Take it.

Day 2

Jon and Pak Hamzah start the session in the evening due to some business that needs to be taken care of during the morning. They get themselves at the nearest tree, Pak Hamzah instructs "tuh,tuh!" with "U" shape leash movement and Jon gets up the tree and then plucks the old coconut within 2 minutes. Jon successfully plucks 5 old coconuts and takes rest on the tree about 2 minutes. Then Pak Hamzah shouts "muda!" and Jon starts searching the ripe coconut. After few seconds, 3 ripe coconuts are plucked and touch the ground. Jon gets down after Pak Hamzah pull the leach while says "turun!" Jon gets his reward. Pak Hamzah cuts a coconut and let Jon drinks the juice. The first task in day two of the phase takes about an hour. Even it is long for a tree, it signifies the rewards for the monkey as he performs the duty well.

They proceed with another three trees before the noon and stop the activity.

Day 3

Jon's training starts in the morning after having his breakfast. Pak Hamzah brings Jon to a high coconut tree which is about 15 feet as an introduction for a higher tree. Jon gets up the tree and soon Pak Hamzah creates a "U" shape movement from the leash. "Tuh, tuh!" said Pak Hamzah and Jon takes a minute looking for the old coconut. Around 6 old fruits fall on the ground. Suddenly, Jon gets down from the tree as he notices a bunch of banana on the nearest bench that was brought by the research assistant. He rushes and enjoys all of the banana. Pak Hamzah simply observes the behavior. He says there are times the animals are like human, need a break too.

The researcher uses the slot to get more information from the research. According to Pak Hamzah, he treats the monkey like his own son. He seldom scolds him and treats him with passion. As he is talking, he pats the monkey's head. Jon enjoys the attention given. They call off the day after Jon finishes eating some biscuits shared with the owner. The session only takes 45 minutes.

Day 4

The training session starts at 11.00 a.m. after the rain clears in the morning. Pak Hamzah brings Jon to the furthest coconut tree around his house. The leash is moved in "U" shape while he shouts "tuh,tuh!", asking Jon to climb the tree. As Jon arrives at the top of the tree, Pak Hamzah shouts "ambil!" After two minutes of creeping on the tree, seven old coconuts touch the ground. Pak Hamzah pulls the leash to get Jon down but he refuses. Then, Pak Hamzah takes the chance ordering Jon to pluck the ripe coconut by shouting –"muda!"

Jon shouts with a higher pitch sound as a sign of understand. After a minute of twisting one ripe coconut falls and followed by two more ripe coconuts after few moments. As Jon is twisting the 4th ripe coconut, he jeers (squeals and screams) in a louder sound and aggressively rushes down from the tree. It is caused by a few hornets that are between the coconut leaves. Jon refuses to continue the training. Most likely he is stung by the hornets. Pak Hamzah calls the day off.

The training only takes about an hour.



## 9.5 Phase IV- real task (coconut plucking activity)

No of Visit: 4

Venue: Within owner's house compound

Time allocated: Two hours for each visit

Time allocated for all sessions in Phase II by the researcher:  
Eight hours

Day 1

On this visit, Pak Hamzah says that Jon is ready for real plucking activity. The activity starts in the morning at 8.00 a.m. Jon is taken by Pak Hamzah to a coconut farm at the end of the village by bike. Before the activity starts, Jon is served with breakfast consisting of white rice and plain water. Jon enjoys the meal and after having his breakfast, Pak Hamzah moves the leash in "U" shape while shouts "naik, naik!" Jon climbs up the tree and Pak Hamzah continues shouting "tuh,tuh!" After moving in circle around the fruits, Jon starts twisting the coconuts one by one. All they manage to work on six trees within three hours. Jon successfully plucks 150 old coconuts. The morning session ends and they rest under the shades.

Pak Hamzah serves the same dish for Jon's lunch. He eats the dish hungrily. Jon is tied at the coconut tree for about thirty minutes while Pak Hamzah heads to the nearest mosque to perform prayer.

At 2.00 p.m, the activity resumes. The leash is moved in a "U" shape with the command - naik, naik from Pak Hamzah. Jon gets up the tree and starts twisting the coconuts. After 10 trees, Jon suddenly runs down the tree while shouting loudly as he could sense the hornet on the tree. Pak Hamzah brings Jon to the next tree and asks him to climb up the tree. Jon grumps at Pak Hamzah as a sign of unwillingness to continue the job. Pak Hamzah decides to take a short break. After a 10 minute break, they continue the activity. Jon successfully brings 180 coconuts down in three hours a which makes the day total of 230 coconuts. They call it off for the day and head back home for dinner and rest.

Day 2

At 8.00 a.m, Jon is served with his normal breakfast. After a while the rain starts and stops after two hours. This weather retards the activity for the day. At 10.30 am, Pak Hamzah starts his bike and calls Jon to get on the bike. They go to the coconut farm which is still in the village. As they reach the place, Jon climbs up the tree and as usual he would move around the bunches of coconut.

Pak Hamzah would shout – "tuh itu", "ambil ambil", repetitiously. The monkey starts twisting the coconuts and keeps continuing from tree to tree. He is able to pluck only 52 coconuts due to time constraints. As the day gets hotter, they have their lunch under a shady tree. Jon is served with white rice and long beans boiled together. They work until 1.00 p.m.

After Pak Hamzah returns from the prayer, they resume the activity. At some point Jon gets slipped from the coconut tree due to the wet trunk. A total of 110 coconuts are successfully plucked by Jon on that evening. The total number of coconuts plucked for today is 162 coconuts. After three hours of activity, they stop and end the day.

Day 3

As usual, the plucking activity starts at 8.00 a.m after Jon has his breakfast. Jon is taken to the nearest kampung's (village) yard. Pak Hamzah shouts –"naik, naik!". Jon gets up the tree and Pak Hamzah shouts "tuh,tuh!" One by one the coconuts falls on the ground. Then, Pak Hamzah shouts "muda, muda!" and Jon starts looking for the ripe fruits. Once the ripe fruits are recognised, he twists the fruits and let the coconuts

fall on the ground. Jon manages to pluck 40 old coconuts and 30 ripe coconuts. The session lasts for two and half hours.

In the evening, Pak Hamzah brings Jon on the bike to the nearest stream for a treat. Jon is bathed in the stream to cool down his body temperature as the day is very hot . He washes Jon's fur to keep it clean. This is being done to avoid any health problems. Jon screams joyfully as he enjoys the treat. After that, Pak Hamzah calls off the day and then they go home.

Day 4

At 8.30 a.m, Jon is served with his normal breakfast. Today he has few fruits like bananas and star fruits. Then, Pak Hamzah starts his bike and calls Jon to get on the bike. They go to the coconut farm which is a bit far from the village. Once they reach the place, Jon climbs up the tree and as usual he would circle around the bunches of coconut.

Pak Hamzah would shout – "tuh itu", "ambil ambil", repetitiously. The monkey starts twisting the coconuts and keeps climbing from tree to tree. They have a short break at ten plus. Pak Hamzah sits under the tree and puffs his leaf cigarette. They have their lunch at 1.00 p.m. where Jon is served with white rice mixed with boiled fish. He is able to pluck 164 coconuts within four hours.

## 9.6 Phase V- Interview

Number of Visit: 3

Total Time: 3 hours

The interview is done after every visit. It is being done in order to get more details of the macaque monkey, Jon , a coconut plucker. The well being of the monkey is discussed as well. Monkeys are like human. There are times they get flue and fever. When these happen, the owner would give traditional treatment like honey, lemon and raw eggs. It also means Jon is on medication and would not go for coconut plucking.

After all of the observation sessions are done, three more interviews are conducted; two sessions at the owner's house and another is at the stall nearby. Each takes about one hour. The phase is used to wrap the observation done earlier.

Pak Hamzah plans to use Jon's service for at least three more years, depending on his (Jon) health condition. He doesn't plan to sell Jon and intends to keep it. When being asked about letting Jon to the wilderness, he says that it is impossible to do it because Jon has been kept in captivity for so long. Pak Hamzah doesn't think the monkey can survive by its own.

## 10. DISCUSSION

The cognitive intelligence of pig-tail monkey like Jon still remains a mystery. Somehow, the local forms of training are similar to the training stages documented by International Primatological Society. Consistency in one exhibited skill may shape the owner's preferences in employing macaques in doing certain tasks. In this study, Pak Hamzah has chosen to bring in Jon to the field and depended on him to harvest coconuts as a source of income.

In the case of Jon, the handler or owner needs at least 20 weeks to train him with the coconut plucking exercise before bringing him for a real task. The orientation week is the hardest because it is the period to adapt Jon from a wilderness to the human world. He is introduced to the proper meals and direct contact with human. He still senses the surrounding as a

danger especially when people are around.

Jon is introduced to the coconuts as well. It is to keep the macaque interested in coconuts, and it can be considered as the most difficult part. The important aspect of this stage is the trainer's encouragement in letting the animal engaging with the coconuts. The fruit is purposely introduced so that the monkey can touch and explore the features of coconuts. It is also to give an idea that coconuts now becomes an important element in his life.

Another aspect during the orientation is the subject's ability to spin and twist the coconut. The trainer guides the macaque's neck shackle, accompanied by the vocal command "ambil", which is used to teach it how to twist the fruit. The trainer also rotates the coconut in the monkey's hand so that it would directly feel the circular motion and could learn to twist the fruit [23, 27].

In the demonstration stage, the monkey learns new vocab, 'tuh itu', which literally means- that one. It refers to the certain coconut to be plucked. The next stage is bringing the monkey to the real scenario where he starts to do the harvesting. The number of instructions is also being increased and repeated so that the monkey is familiar with the word command. The words are repeated few times followed by the handler. He also uses his hands, face, and leash to point at the targeted coconuts. The entire process is repeated several times for three days up to 30 months to enable the macaque to solve complicated problems while working [28].

It is found that the handler would train macaque to distinguish the desired objects. In this case, although Jon is new, he is smart and able to select the right coconuts without receiving a lot of commands. He uses the twisting skill to pluck the coconut, which is the simplest. Somehow, from the observation, there are times Jon would use hands and feet to spin the ripe coconuts. However, Jon improves his skills from day to day. This can be seen in term of the speed of plucking coconuts which increases from time to time.

This study also shows that approximately six vocal commands are used in the handler's dialect. The commands function for pointing, for motivating, and for lessons. All these commands are employed by handlers using voice, face contact, and hands at the same time. In some cases, experienced macaques would jump from one tree to another or bridged the gap [29]. The handlers would use the vocal command for "jump" if they wanted the macaques to cross over to other trees.

Some researchers describe pig-tail macaques as silent monkeys because they seem to be very quiet. When seen running away after an episode of crop raiding, Jon is almost completely silent. This silent tactic is not limited to simply crop raiding and shows up in most encounters where Jon is fleeing a certain area.

However, Jon does make a lot of vocalizations. The most often used vocalization is the "coo." It can be either a short call or a long call. Some other vocalizations are made when Jon is threatened or could sense the danger, especially when he is stung by hornets or being approached by kids. These are in line with the study which states some other sounds produced by primates include "squeals," "screams," "growls," or "barks," and "screeches" [30].

Pig-tail macaques use other forms of communication like visual cues and body postures. Like other primates, touch and chemical cues also are likely to play a role in social communication [30, 31]. All these forms of communication are shown by Jon during the observation of the study.

In pig-tail macaques' society, facial gesture behaviors are mostly used to communicate among individuals in the group [32, 33]. In the case of Jon that is being kept in captivity, the communication between the primate and his handler is pertinent as a form of security. It ties a bond between them because Jon has no friends from his species at all. Some of the communication he shows are as the following:

**Fear grimace:** The lips are retracted so that the teeth are shown; the teeth are clenched together. This display functions as an appeasement signal to reduce.

**Staring with open mouth:** This is the stare accompanied by the mouth being open but the teeth are covered. This is a threat expression to strangers and even the people that Jon familiar with. This is very obvious with the presence of researcher on the early days of the study.

**Pout-face:** The lips are pushed forward, and this display is used when Jon senses there are dangers approaching to attack. As the kids like to tease him, Jon shows his uneasiness towards them.

**Shaking Den:** Most probably as a sign of territory. Jon would shake it when other people come closer to its den.

**Petting/stroking-** This is the most appropriate gesture to create a good bond between the owner and the primate. It shows that the affection and love given by the owner. As a macaque is no longer living in its natural colony, the stroking is very important to cure the loneliness.

## 11. LIMITATION AND RECOMMENDATIONS

In this study, a focus is given on a single macaque since it would be difficult to handle more than one of the species at a time. Further studies on few macaques focusing on their skills development, physical usage, age, gender and language commands would be necessary to explain the diversity in terms of vocalization, laterality and complete modeling of coconut harvesting by pig-tail macaques.

## 12. CONCLUSION

Coconuts are pertinent to the traditional lifestyle and livelihood of the people especially in the Eastern region. However, the coconut business has dropped drastically due to a shortage of climbers. With fewer people are willing to take up the arduous and risky job of coconut plucking, it has adversely affected the coconut business. Training macaques is the best way as a helping hand. Monkeys are smart and can get nuts from even tall and slender trees. They are also cost effective compared to men.

The idea to fully utilising macaques at the plantation is nothing new as they are a genius creature that indisputably play their own unique roles in which men fail to address.

Indeed, the monkeys are very similar to family pets, and for some households, they are like family members to some degrees. As long as they are well taken cared of and showered with love, having them in the industry should not be an issue. Primate and men may complete each other, where there is a profit to be made on the backs of non-human. Just give the primates more of a voice, they can make themselves better understood. It is as though they can talk back to us. This can be very valuable in the circle life of universe.



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