



A Study of Kitten Behaviours in The Urban Backyard

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Abstract

Kitten is the earliest stage of a cat's life, starting from 0 – 6 months old. As the golden age of a human baby in their first 1000 days of life, a kitten is the golden period for cats to grow and explore the environments. People tend to adopt cats at this stage as it is easier for them to shape and understand the characteristics of their cats. Therefore, understanding the behaviors of cats during the kitten period is fundamental. This study observed the behaviors of two pet kittens at 13 weeks of age when they roamed around the urban backyard. An ethogram was designed to record the duration of states (in second) and the frequency of events (per observation) of all behaviors. During the assessments, both kittens dominantly performed exploratory behaviors. They tended to explore the environment by sniffing ground, climbing trees, staring at birds, and walking around the backyard. These behaviors could be seen more often than their playing behaviors (object play and social play). In conclusion, this study supports the view that during the late socialization period (9-16 weeks), kittens seem to show the intense exploration of the environment as part of the development of predatory behavior or hunting skills in wild nature settings.

Keywords: Cat, environment, kitten, wild nature

Background

The domestic cat (*Felis catus*) has been one of the most common domestic animals chosen as companion pets globally. In New Zealand and some European countries, cats are even more famous than dogs (Companion Animal NZ, 2016; Fediaf, 2018). Australians are identical to their pet ownership lifestyle. Almost 60% of Australian households have pets recently, and domestic cats are the second most common pets after dogs (AMA, 2019). There has been a decline in ownership of cats in Australia from 3.2 million in 1998 to around 2.4 million in 2004 (Baldock *et al.*, 2003). However, the latest national survey conducted in 2019 showed that the pet cat population has bounced back to approximately 3.8 million and becoming a part of Australian households (AMA, 2019).

A study of felids' phylogenetic relationships has found that the domestic cat's ancestors, the wild cat (*Felis silvestris catus*), existed about 35 million years ago as the roots of all cat species. They later dispersed throughout the world, especially to Africa, Europe, and some parts of Asia continents (O'brien *et al.*, 2008). The domestication of cats has been suggested to firstly begin in the Middle East around 11,000 years ago aiming to protect agricultural harvests i.e., barley and wheat from small rodents, yet full domesticated status of cats has been believed occurred in Egypt (Zeuner, 1963; Faure and Kithener, 2009). The cats were often portrayed in ancient Egypt tombs as a sacred symbol (Faure and Kithener, 2009).

In contrast, Australian cats have been known as introduced species. The early European settlements have been thought to

be responsible for the domestication of cats in this continent. The introduction of this species to mainland Australia initially aimed to control the rapid colonisation of wild rabbits. This facilitated further feral cats' infestation from north-west South Australia and Western region to now Australia-wide (Carruthers, 1892; Rolls, 1969; Jones, 1989). Since then, Australians have been experiencing cat ownership as a part of their life.

Despite cat popularity, cat ownership has been controversial in Australia. Like feral cats, free-roaming house cats have been associated with community health issues and the decline in the native Australian wildlife population (Dickmand, 2015; McLeod *et al.*, 2015). Cat predation has occurred even though the owners have fed the cats. This has posed a significant problem in urban prey populations, especially some species of birds (Baker *et al.*, 2008). National campaigns have been running since the 1990s to push the idea of limiting the house cats roaming outside due to several arguments, including preventing cat predation and cat injury due to vehicle collisions or other harms (McLeod *et al.*, 2015). However, there have been some barriers to this effort. One of them is that the owners have perceived roaming in cats was a natural behaviour to make them more pleased, and it was cruel to contain them indoors (McLeod *et al.*, 2015).

There have been several considerations of the cat lovers to choose between adopting a kitten or adult cats. Zito *et al.*, (2015) stated that most cat lovers who came to animal shelters tended to adopt kittens rather than adult cats. This has brought the adult cats in some Australian animal shelters were decided to be euthanised, although the costs required to adopt and raise a kitten is generally more expensive than adopting and caring for adult cats. Kittens need multiple vaccinations and dewormed extra nutritional care to support their optimum development. However, they were still preferable to be adopted than adult ones as they were thought easier to rehome or be adapted to the new environment (Alberthson *et al.*, 2013; Brown and Morgan, 2015). Also, for some new people

to the cat's world, adopting a kitten was considered the best introduction to cat ownership (McLeod *et al.*, 2015).

Understanding cat behaviour is pivotal as owning cats have been one of the lifestyles in this modern world. Cat behaviour was first conducted in 1956 by a German scientist focusing on general cat behaviours (Turner, 2013). The kitten stage has been linked to adult cats' physical and behavioural developments (Atkinson, 2018). More research has been done to measure the development of social play in kittens (West, 1974; Barret and Bateson, 1978). Other studies have been focused on the development of kitten predatory behaviours (Caro, 1974; Caro, 1980; Caro, 1981). These studies developed some trials to observe the responses of the kittens being directly exposed to live prey such as laboratory mice and live canaries in a room setting. The results showed that as the social play decreased at 6-7 weeks after birth, the kitten predatory behaviour developed. The knowledge about domestic cat behaviours have been mostly obtained from laboratory, animal shelters, or feral cat observation (Bernstein & Friedmann 2014). To date, however, there has been limited information concerning the observation of predatory behaviour of free-roaming house kittens to see the development of this behaviour in an actual outdoor setting.

This study aimed was to observe the common behaviours of pet kittens when spending time roaming around and playing in the backyard by measuring the duration of each behaviour state such as play, active exploration, rest, maintenance and other behaviour events such as groom, yawn, stretch, urinate and dig. The results were analysed to see some pet kitten behaviours that potentially related to predatory behaviour. The outcome of this study might be to give awareness and educate the owners about the potential adverse effects of letting the kittens spend much of their time roaming outdoor.

Materials and Method

Study Subjects

For this study, two of 13 weeks old male domestic kittens (coded as Kitten 1 and

Kitten 2) from the same parent were chosen for this study. The owners were two women living in Gatton town, Queensland, with a shared backyard. The kittens were adopted when the age of 2 months. They usually spend time together in the morning and afternoon in the backyard after feeding then playing together for about an hour. They had no vaccination and deworming history yet. However, the general performance was good. During the day, the kittens spent both times indoors and outdoor, yet at night they were kept outside of the owner's house at a special resting area with bedding and toys.

Study Site

The study was conducted on 10th April 2020 to observe the kittens' behaviours in the owner's 5 x 15 m² backyard in the afternoon from 4 to 5 pm. The backyard consisted of various plants and trees, a rotary clothesline, a set of garden furniture, and some garden tools and cat toys.

Observation Design

The consents from the owner were received prior to activities. Data were collected on the same day with a limited time due to restricted visiting regulations amid the Covid-19 pandemic. The preliminary observation was held before the actual observation to build habituation of the kittens with the observer as a stranger. The owners were asked to let the kittens play together and roamed freely while the owners had an afternoon chat with their two friends on the backyard's table.

The sampling method was a focal sampling to capture all behaviours of an individual kitten. The kitten activities were video recorded using an iPhone XR. The recordings were conducted three times for each kitten. The duration of each random session was 5 minutes (300 seconds). The first 5-minute recording mainly focused on Kitten 1 behaviours while he explored or played and socialised with the humans and his sibling. The next 5-minute observation focused on Kitten 2 to record the same data, and so forth until each kitten had three-time observations. A 5-minute break was taken between sessions. All the recordings were

transferred to a MacBook-Pro and watched again using a QuickTime Player app to score all occurrence behaviours.

Data Analysis

An ethogram was designed following the preliminary observation to allocate and calculate the duration of states (in second) and the frequency of events (per observation) of all behaviours of each kitten with other objects (Table 1).

In terms of an active state, all sub-behaviours were counted into one state most of the time, and some active behaviours were exhibited simultaneously. For instance, the kitten could stare while walking, walk then jump to the sibling, or walk then running immediately.

The results were presented in an activity budget to show the time spent for each state and event of individual kittens.

Results

It can be seen from Table 1 that, in general, both kittens spent the majority of their outdoor activities actively exploring the backyard, accounting for 45% and 57% of their time budget in Kitten 1 and Kitten 2, respectively. They were actively sniffing ground and grass, staring at birds and butterflies, walking around the backyard, running after siblings and the owners, climbing trees and clothesline poles.

The second most common behaviour category identified was resting (28% in Kitten 1 and 25% in Kitten 2), in which they were standing, sitting, or lying after roaming the garden for some time. Compared to his sibling, Kitten 1 exhibited play, either solitary or social play, more often than Kitten 2 (20% in Kitten 1 and 7% in Kitten 2). Kitten 1 was more sociable than Kitten 2, whereas Kitten 2 was more interested in roaming around Table 2). Table 3 show the overall time budget (in second) of each kitten having outdoor activities in the backyard, including the proportion (%), mean and standard deviation (SD) of each behaviour in a total observation time (900 seconds).

However, both had a similar proportion of exhibiting other behaviours (3%). During observation, it could be seen

that kitten 1 presented self-grooming, yawning and stretching while kitten two had urinated twice after showing scratching or digging behaviour. In terms of eating/drinking for physiological maintenance,

only Kitten 2 was interested in eating grass, which accounted for 7% of his activity budget. In contrast, Kitten 1 did not eat or drink during his outdoor activity (Table 2).

Table 1. Ethogram describing state and event behaviours recorded for each individual kitten.

Behaviour				Code	Description
State	Play	Solitary play		SoP	Playing with inanimate objects i.e., toys including chasing, pawing, pouncing, and mouthing
		Social play		ScP	Physical contacts with sibling or humans including wrestling, crouching, chasing, pawing, biting, grooming without sounding any growling, hissing or other vocalisations
	Active	Exploration	Sniffing	SN	Smelling the environment ie. air or ground, by inhaling air through the nose. This can be combined with other locomotion i.e., walking
			Staring	ST	Keeping eyes looking directly towards something i.e., birds or butterflies
			Walking	W	Moving upwards of all four legs in a slow pace
			Running	R	Fast forward movement of all four legs to certain target
			Climbing	CL	Moving vertically up and down to an object i.e., trees using claws to grip substrate
			Jumping	J	Leaping from one point to another
	Rest	Lying		L	Kitten's belly is on the ground with all legs were flexed and eyes were open
			Sitting	SI	Kitten is an upright posture, hind legs flexed touching the ground and front legs are straight and tall.
		Standing		SD	All four legs are straight and extended on the ground without forward or backward locomotion.
		Eat		E	Grinding and swallowing something i.e., food or grass in kitten's mouth
		Drink		D	Ingesting water from water sources i.e., water bowl
	Out of sight			OS	Kitten cannot be seen by observer
Event	Others	Groom self		GS	Cleaning kitten's own body parts by licking, biting, or scratching
		Stretching		SR	Extending front legs while curving the back inwards
		Yawn		Y	Opening the mouth and inhaling air with eyes closed
		Urinate		U	Releasing the urine on the ground in a squat position and the back is upright
		Digging		D	Moving substrates i.e. soil using its claws

(Adapted and modified from Stanton *et al.* (2015)).

Discussion

The most significant findings in this study revealed that kittens aged about three months old tended to be more interested in exploring the environment than playing Either with objects such as toys or

exhibiting social play with conspecific and humans. As about half of their activity budget was spent roaming around quite a large outdoor space, they also needed plenty of time to rest and maintain their energy.

The subjects in this study were littermates of the same sex. They spent the first two months of their lives with their mother and other siblings before being adopted by the new owners. This means they passed the weaning period well before being separated from their mother, apparently affecting their current active behaviours. In domestic cats, the weaning period is considered finished around seven weeks of age when suckling behaviour is reduced as the kittens normally start to eat solid food and be more independent (Turner, 2013).

In addition, by four weeks after birth, the kitten and its littermates start to

exhibit social play and become more active and aggressive in a positive way. Their playful social interaction involves chasing and wrestling continues and reaches a peak until 12 – 14 weeks, then starts to decline periodically (West, 1974; Caro, 1981). This supports the results of this study in which Kitten 1 and Kitten 2 only spent less than a fourth of their activity budget with social play. The siblings have got to know each other since they were born, so it is possible to think that their familiarity with one another is enough and so embracing more experience exploring the environment at their current age is more prominent.

Table 2. The table shows the records of all activities of both study kittens over three-time observations in a day, recorded for five minutes (300 minutes) for each observation. The kittens spent the majority of outdoor time in the afternoon by actively exploring the backyard, followed by resting, and then playing.

Behaviour	Code	Kitten 1					freq.	Kitten 2				freq.
		O1	O2	O3	Total			O1	O2	O3	Total	
State	Play	SoP	64	0	0	64		0	3	7	10	
		ScP	14	18	88	120		33	14	8	55	
	Total					184					65	
Total					409						514	
Active exploration		AE	93	168	148	409		110	170	234	514	
Rest	L		24	42	5	71		63	10	16	89	
	Si		85	50	20	155		36	50	29	115	
	Sd		0	0	22	22		0	22	0	22	
	Total					248					226	
Eat/ drink		E	0	0	0	0		58	0	0	58	
Total						0					58	
Out of sight		OS	0	22	13	35		0	11	0	11	
Total						35					11	
Event	Others	GS	9	0	0	9	3	0	0	0	0	
		Y	3	0	0	3	1	0	0	0	0	
		SR	8	0	0	8	3	0	0	0	0	
		U	0	0	0	0		0	3	6	9	2
		D	0	0	4	4	1	0	17	0	17	1
	Total					24					26	
Grand Total			300	300	300	900		300	300	300	900	

Like a human's baby, a kitten also has its golden age in the first year of its life. This plays a significant role in building its skills to adapt and cope with various environmental conditions (Turner, 2013). During the first trimester of this period, the kitten actively roaming around the environment was likely to develop predatory

behaviour (Turner, 2013). Both roaming and playing engage active locomotion, rapidly developing at around 7-8 weeks of age (Martin and Bateson, 1985). In the case of study subjects, despite the high proportion of roaming around, the kittens were still spending a certain amount of time playing together since social play during the third

month after birth was also associated with predatory behaviour (Caro, 1981).

Therefore, the natural hunting skills of both kittens started to develop.

Table 3. The overall time budget (in second) of each kitten having outdoor activities in the backyard including the proportion (%), mean and standard deviation (SD) of each behaviour in a total observation time (900 seconds).

Behaviour	Kitten 1				Kitten 2			
	Total activity (s)	Proportion (%)	Mean	SD	Total activity (s)	Proportion (%)	Mean	SD
Play	184	20.44	61.33	36.65	65	7.22	21.67	11.85
Active Exploration	409	45.44	136.33	38.84	514	57.11	171.33	62.01
Rest	248	27.56	82.67	27.71	226	25.11	75.33	21.71
Out of sight	35	3.89	11.67	11.06	11	1.22	3.67	6.35
Eat/ drink	0	0.00	0.00	0.00	58	6.44	19.33	33.49
Others	24	2.67	8.00	3.06	26	2.89	8.67	4.54
Total	900	100			900	100		

In addition, social play with humans was detected in both kittens. They exhibited a willingness to respond the invitations to play with the owners. They also approached the observer even though they felt a little anxious in the first encounter. Collard (1967) reported that a fear of strangers during the first five weeks of a kitten's life could impact their willingness to play. The more the number of strangers people are exposed to early in their 5 to 9 weeks old, the less likely they will be fear of strangers in adulthood. Nevertheless, this should be done gradually. Therefore, it is better to expose the kitten with to a certain number of people earlier to build up its confidence, courage and friendliness to humans (McCune, 1995).

During the observation, it could be seen that Kitten 1 and 2 could responsively stare at birds and butterflies, which usually come to the backyard in the afternoon until before dusk. Since they were not fully indoor kittens, their natural instincts to recognise prey evolved. Caro (1980) stated that young kittens are encouraged to interact with prey if their littermates are present. Their mother could also inherit predatory instinct in a natural setting if the mother was also a free roamed cat and so she could demonstrate her predatory skills to the kittens (Hudson *et al.*, 2011). However, the owners of both study subjects had very limited information about the kittens' family background.

Moreover, the kittens who gained hunting skills at an early age were likely to

have better predatory skills in adulthood than other individuals with no similar experience (Caro, 1979). The climbing behaviour of both study subjects was also recorded in this study. Guyot *et al.*, (1980) reported that enough maternal care influences climbing behaviour. A kitten that was not learning how to climb from the mother tended to be reluctant to climb when presented with high objects such as shelves of ramps in an indoor setting. In wild cats, climbing trees in a kitten stage was a part of physical exercise to support their hunting skills (Sunquist and Sunquist, 2002).

Conclusion

This study examined the behaviours of two 13-weeks old pet kittens spending an outdoor activity in the urban backyard. The results showed that they spent most of their activity budgets exploring the backyard rather than playing. This was assumed to correlate with the stage of development of their predatory behaviours.

The observer acknowledged many limitations of this study, such as the number of study subjects and the length of observation time. However, the idea of this study could be a preliminary to a more in-depth observation of kitten behaviours in each stage of their adolescence period to understand the possible adverse effects of predatory behaviours of urban kittens on wildlife surrounding them. In this stage, the threats of certain behaviours exhibited by both study subjects were subtle since they did not show any attacks to wildlife yet, but

the possibility in the future is real, so the owners should be more aware and careful of their kitten attitudes.

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