

A Standardized Ethogram for the Felidae: User Guide

1. Behaviors

Researchers should start by selecting which base behaviors should be used depending on the specific aim of their study. The titles of the base behaviors are written in bold text. If unsure of which behaviors to observe, researchers may consult the behavioral categories list for suggestions of which behaviors to measure.

Additional information about the base behaviors is located directly below the definitions. This information either explains the behavior in further detail, or states other behaviors that may accompany the base behavior being discussed. If appropriate, the researcher may choose to include the additional information within their definition.

If a researcher wishes to combine some behaviors to be scored together, as opposed to separately as they appear in the ethogram, it may be helpful to consult the behavioral categories, or create a new category and state which behaviors will be categorized within it. Additionally, a researcher can pull other behaviors into their definition at any time if they are to be scored together, so long as it is stated.

Table 1. A standardized ethogram for the Felidae including definitions for all base behaviors.

Title	Definition
Allogroom	Cat licks the fur of another cat's head or body. - In human-cat studies, this can be scored when a cat licks a human.
Arch Back	Cat curves back upwards and stands rigidly. - May be accompanied by piloerection .
Approach	Cat moves toward (modifier) while looking at it.
Attack	Cat launches itself at (modifier) with extended forelegs and attempts to engage in physical combat. - Can include biting and cuffing .
Avoid	Cat moves, or changes direction while moving, in order to keep away from (modifier). - In social avoid , can include movement caused by being approached by (modifier) (i.e. cat is displaced by modifier) as well as avoiding (modifier's) gaze.
Bare Teeth	Cat opens its mouth slightly while pulling lips back to expose teeth.
Bite	Cat snaps teeth at and is successful in biting (modifier).
Body Rub*	Cat rubs any part or entire length of body against (modifier). - This can be further subdivided to identify the specific area of the body, such as Flank Rub , Neck Rub or Tail Rub .
Body Shake	Cat rotates its abdomen from side to side.
Carry	Cat picks (modifier) up off the ground and moves it to another location.
Charge	Cat rushes toward (modifier). - Cat may stop abruptly in front of (modifier) or continue rushing until contact is made. - Can be scored separately by subdividing into charge with contact , or charge without contact (Miller and Kuhar, 2008).
Chase	Cat runs rapidly in pursuit of (modifier).
Chew	Cat grinds an object in its mouth using the teeth.
Clawing	Cat drags front claws along an object or surface, likely leaving visual marks behind. - Strokes may be alternating and vary in speed.

Climb	Cat ascends and/or descends an object or structure.
Copulation	<p>Male mounts female and intromission is achieved.</p> <ul style="list-style-type: none"> - May occur in a number of positions, including but not limited to: belly to back, belly to belly, belly to side (male to female respectively). - Successful intromission may be indicated by a “copulatory cry” (Mellen, 1993) emitted by the female. - In “big cats,” the male may perform an “inhibited” nape bite during or just after ejaculation. - Copulation may be followed by the female twisting away from the male and striking at him. - Once separated, the female may begin rolling or rubbing her back against the ground, and both male and female may perform anogenital grooming.
Crouch	Cat is alert and positions the body close to the ground, whereby all four legs are bent, and the belly is touching (or raised slightly off of) the ground.
Cuff	Cat strikes at (modifier) with forepaw and contact is made. Claws are usually extended.
Defecate	<p>Cat releases feces on the ground while in a squatting position.</p> <ul style="list-style-type: none"> - This can be combined with urinate to create urinate/defecate if both behaviors are to be scored together.
Dig	<p>Cat breaks up or moves substrate around with its paws.</p> <ul style="list-style-type: none"> - Differs from hind feet scraping in that dig can include all paws and does not occur with urination.
Displace	Cat provokes an avoidance behavior from another cat.
Drag	Cat moves (modifier) from one location to another without picking it up off the ground.
Drink	Cat ingests water (or other liquids) by lapping up with the tongue.
Ears Back	Ears are held at the rear of head (UKCBWG, 1995).
Ears Erect	Cat points its ears upward (UKCBWG, 1995).
Ears Flat	Cat flattens its ears to its head, so that they tend to lie flush with the top of the head (UKCBWG, 1995).
Ears Forward	Ears are held at the front of head (UKCBWG, 1995).
Eat	Cat ingests food (or other edible substances) by means of chewing with the teeth and swallowing.
Excess Salivation	<p>Cat salivates heavily.</p> <ul style="list-style-type: none"> - May be accompanied by frequent licking of the face and rapid swallowing.
Explore	Cat moves around attentively while sniffing the ground and/or objects.
Fight	<p>Cat engages in physical combat with another cat.</p> <ul style="list-style-type: none"> - Can include biting and the baring of teeth, scratching, hissing, and growling.
Flehmen	<p>Cat makes a grimaced facial expression, where the mouth is open, upper lip is elevated, and tongue may protrude out of the mouth.</p> <ul style="list-style-type: none"> - Generally follows the sniffing of an object, scent, bodily excretion, or another cat.
Flee	Cat runs away from (modifier).
Flinch	Cat approaches and/or sniffs (modifier), but abruptly stops and retreats or flees from (modifier).

Flirting Run	<p>Female cat feigns running away from a breeding partner.</p> <ul style="list-style-type: none"> - May include the female running short distances, then stopping to roll or look around before continuing to run as the male approaches. - Both partners may also walk around or circle each other (Leyhausen, 1979). - This typically precedes mounting by the male, although length of time, speed, and other specific behaviors vary between species.
Forage	<p>Cat searches for food or other edible substances.</p> <ul style="list-style-type: none"> - Can include the subsequent acquisition of food.
Follow	One cat travels closely behind (modifier).
Freeze	Cat suddenly becomes immobile with body tensed (UKCBWG, 1995).
Fur-plucking	<p>Cat excessively grooms a specific area of its body. This can include any tail- and paw-sucking actions. May result in the removal and visible loss of fur, as well as skin irritation.</p> <ul style="list-style-type: none"> - Can be combined with self-biting to be scored as self-mutilation.
Groom	Cat cleans itself by licking, scratching, biting or chewing the fur on its body. May also include the licking of a front paw and wiping it over one's head.
Groom (anogenital)	<p>Cat grooms its own genitals.</p> <ul style="list-style-type: none"> - Can include penis licking in males.
Ground Slapping	Cat slaps its front paws or stomps its feet against the ground.
Head Butt	<p>Cat briefly pushes its head against (modifier).</p> <ul style="list-style-type: none"> - Differs from head rub in that there is no rubbing action, only a gentle push (Cameron-Beaumont, 1997).
Head-rolling	<p>Cat tosses its head in a circular motion.</p> <ul style="list-style-type: none"> - Typically occurs in a stereotypic pattern, in which the cat will either head roll repeatedly, or will head roll while performing another stereotypic behavior, such as pacing.
Head Rub*	<p>Cat rubs its head against (modifier).</p> <ul style="list-style-type: none"> - This can be further subdivided to identify the specific area of the body, such as Cheek Rub, Chin Rub, Ear Rub, Forehead Rub, Lip Rub, or Nose Rub.
Head Shake	Cat rotates head from side to side.
Hiding	<p>Cat occupies a location away from a specific stimulus (or modifier).</p> <ul style="list-style-type: none"> - This can include behind items or inside shelters.
Hind Feet Scraping	<p>Cat scrapes hind feet on the ground in a backwards direction, shuffling one foot after the other.</p> <ul style="list-style-type: none"> - This action is likely to displace vegetation, soil, or other substrate material. - Typically occurs during urination, but can also occur alone.
Huddling	Cat is at rest , lying or sitting with body in contact with (modifier).
Hunt	<p>Cat actively pursues live prey. Includes movements such as crouching, stalking, or any other species-specific behavior.</p> <ul style="list-style-type: none"> - Includes movements such as crouching, stalking, or any other species-specific behavior. - Can include capture and delivery of a kill bite.
Investigate	Cat shows attention toward a specific stimulus by sniffing and/or pawing at it.
Intromission	The male's penis enters the female's vagina.

Jumping	- See copulation for indirect confirmation behaviors.
Kneading	Cat leaps from one point to another, either vertically or horizontally. Cat pushes forepaws into the ground or (modifier) in a rhythmic, kneading motion.
Kill Bite	- Claws may be extended, retracted, or both (alternating). Cat delivers a strong bite to (modifier), that which may be equal to a bite used to take down and kill prey.
Lick	Cats tongue protrudes from mouth and strokes (modifier).
Lordosis	Female cat raises hindquarters while lowering forequarters to the ground, presenting genitals to male. Tail is often averted to one side. The position is sometimes accompanied by treading of the hind legs.
Lying	Cat's body is on the ground in a horizontal position, including on its side, back, belly, or curled in a circular formation. - Can be scored separately by indicating the position of the body using titles such as: lying on side , lying on back , lying on belly , or lying curled .
Manipulate Object	Cat uses any part of body to touch, hold, move, or pick up, an object.
Mount	A male cat attempts intromission by straddling over the female with front and hind feet. In "small" cats, this may be accompanied by a nape bite and/or treading movements of the hind feet. - The male is typically positioned behind the female, with his belly against her back (although variations can exist). - If homosexual mounting is being observed or measured, the gender of each cat should be altered within the definition.
Nape Bite (small and domestic cats)	The male grips the back of the neck of a female with his mouth while mounting , and may continue holding on during copulation .
Nape Bite (big cats; including but not limited to <i>Panthera spp.</i>)	The male performs an inhibited nape bite , where he will place his mouth on or around the back of the female's neck at the moment of, or just after, ejaculation, but is unlikely to actually bite down.
Nursing	A mother cat feeds her offspring, whereby the offspring drink milk from her nipples by placing their mouths around her nipples and suckling. - Typically occurs while the mother is lying on her side, making her nipples accessible to the offspring.
Nuzzle	Cat moves its entire head and nose side to side against one area of the head or body of another cat (or human).
Other	Any behavior that does not fit into one of the descriptions provided.
Out of Sight	Cat is not visible to the observer.
Pacing	Repetitive locomotion in a fixed pattern, such as back and forth along the same route. Can include walking , trotting and running . Movement seems to have no apparent goal or function. Must be performed at least two times in succession before qualifying as stereotypic .
Patrol	Cat is alert and walks around in a calm, deliberate manner, periodically stopping to perform investigative or marking behaviors.
Paw*	Cat pats (modifier) with its forepaw(s). Claws are usually retracted.
Pelvic Thrust	While in a mounted position, the male makes searching and/or thrusting movements with his pelvic region against the anogenital region of the female.

	<ul style="list-style-type: none"> - If homosexual mounting is being observed or measured, the gender of the cats should be altered within the definition.
Piloerection	Cat raises the hairs on the nape of its neck, shoulder, back or tail, so that the fur is standing erect.
Play*	<p>Cat interacts with something in a “non-serious” manner (i.e. where there is no intention to harm).</p> <ul style="list-style-type: none"> - Solitary Play might include: chasing, pawing, pouncing, wrestling with and throwing an (object) into the air, or pawing at its own tail. - Social Play might include: chasing, wrestling, biting, pouncing and pawing.
Play Roll on Back	Cat rolls onto its back, with its belly exposed and all paws in the air, within a playful context. All agonistic behaviors are absent (i.e. hissing, ears back).
Pounce	Cat leaps onto (modifier).
Raise Paw	Cat lifts its forepaw as if to cuff, paw or strike at (modifier) but does not follow through with the action.
Rake	Cat makes kicking movements with one or both hind legs against (modifier).
Rear	<p>Cat stands up on its hind legs with forelegs toward or against (modifier).</p> <ul style="list-style-type: none"> - In the case of rear (object), forelegs may be reaching up to obtain something.
Retreat	Cat backs away from (modifier) while watching it.
Roll*	While lying on the ground, cat rotates body from one side to another. During the roll , the back is rubbed against ground, the belly is exposed and all paws are in the air. Cat may continue rolling repeatedly from side to side.
Roll on Back	<p>Cat rolls onto its back and becomes stationary, with its belly exposed and all paws in the air. The body is usually tense, and may be accompanied by hissing and ears back.</p> <ul style="list-style-type: none"> - This behavior may vary between species.
Running	Forward locomotion in a rapid gait, which is faster than walking or trotting.
Scratching	Cat scratches its body using the claws of its hind feet.
Self-biting	<p>Cat bites or chews on an area of its own body, which may result in damage to the fur or skin.</p> <ul style="list-style-type: none"> - Can be combined with fur-plucking to be scored as self-mutilation.
Self-mutilation	Cat performs any self-injurious behavior (including self-biting and fur-plucking), which may result in a visible loss of hair and skin irritation or abrasion.
Sitting	Cat is in an upright position, with the hind legs flexed and resting on the ground, while front legs are extended and straight.
Sleeping	Cat is lying on the ground with its head down and eyes closed, performing minimal head or leg movement, and is not easily disturbed.
Snap Bite	Cat opens its mouth and snaps it shut, as if biting the air (Cameron-Beaumont, 1997).
Sniff*	<p>Cat smells (modifier) by inhaling air through the nose.</p> <ul style="list-style-type: none"> - Can be distinguished by the proximity and movement of the cat’s

	nose and muzzle (Feaver et al., 1986).
Sniff Air	Cat inhales air through the nose with its head raised and nose not in close proximity of any particular object or surface.
Sniff Anogenital	Cat smells the anogenital region of another cat.
Sniff Nose	Two cats smell the nasal regions of each other.
Stalk	Slow, forward locomotion in a crouched position directed toward (modifier), with head kept low and eyes focused on (modifier).
Standing	Cat is in an upright position and immobile, with all four paws on the ground and legs extended, supporting the body.
Stare	Cat gazes fixedly at (modifier) and is not easily distracted. In the case of social stare , gaze may be directed at another cat's eyes.
Stretching	Cat extends its forelegs while curving its back inwards.
Strike At	Cat swipes forepaw at (modifier) but no contact is made. - When contact is made, behavior should be scored as a cuff .
Swimming	Cat propels itself through water using its legs.
Tail Bent-Up	Tail is bent in an upward curve (Cameron-Beaumont, 1997).
Tail Down	Tail is held down with the end kinked out (Cameron-Beaumont, 1997).
Tail Half-Up	Tail is held at a 45° angle to the tail up posture, or thereabouts (Cameron-Beaumont, 1997).
Tail Over	Tail is bent directly over the body (Cameron-Beaumont, 1997).
Tail Parallel	Tail is parallel to the ground, sometimes slightly curved (Cameron-Beaumont, 1997).
Tail Quiver	Part of, or the entire tail, is vibrated while raised in the up or half-up position (UKCBWG, 1995; Cameron-Beaumont, 1997).
Tail Slap	Cat quickly strikes its tail on the ground (UKCBWG, 1995).
Tail Swish	A violent swish of the tail; more rapid than a tail wave but smoother than a tail twitch (Cameron-Beaumont, 1997).
Tail Twitch	A rapid flick of the tail in either a side to side or up to down motion (UKCBWG, 1995; Cameron-Beaumont, 1997).
Tail Under	Tail is tucked right under the body. This position is normally held whilst the cat is crouching in a defensive manner. (Cameron-Beaumont, 1997; Bradshaw and Cameron-Beaumont, 2000).
Tail Up	Tail is held in an upright position (Cameron-Beaumont, 1997).
Tail Wave	A slow and gentle wave of the tail from side to side (Cameron-Beaumont, 1997).
Threaten	Cat directs aggressive behaviors toward (modifier) without making any physical contact with it. - Can include baring the teeth , snarling , arching the back , piloerection , ground slapping , striking at with the paw, extending claws, and producing various vocalizations (spitting , hissing , growling , etc.).
Touch Noses	Two cats sniff at and touch each other with their noses. - If there is difficulty in confirming that the noses physically touch, it can be scored as sniff nose .
Treading	Rhythmic, raising and lowering of paws so that cat is stepping in place.
Trembling	Fine muscle tremor or spasm of the body or legs (Griffith et al., 2000).
Trotting	Forward locomotion at a swift gait performed with alternating steps. Movement is faster than walking but slower than running .

Urinate	<p>Cat releases urine on the ground while in a squatting position.</p> <ul style="list-style-type: none"> - May be preceded or followed by digging movements. - This can be combined with defecate to create urinate/defecate if both behaviors are to be scored together.
Urine Spray	<p>While standing with tail raised vertically, cat releases a jet of urine backwards against a vertical surface or object. The tail may quiver as urine is discharged.</p> <ul style="list-style-type: none"> - May also be accompanied by hind feet scraping.
Urine Walk	<p>Cat urinates in standing position, usually combined with walking (Fazio, 2010).</p>
Vocalize	<p>Cat produces sounds or calls, originating from the throat and mouth.</p>
Vomiting	<p>Cat ejects stomach contents out of its mouth.</p>
Walking	<p>Forward locomotion at a slow gait.</p>
Watch	<p>Cat observes a specific stimulus (or modifier).</p> <ul style="list-style-type: none"> - Behavior is distinguished by tracking movements of the eyes and head (Hall and Bradshaw, 1998).
Wrestle	<p>Cat engages in physical contact with (modifier), whereby the cat struggles with (modifier). Can include pulling (modifier) toward itself with its forelegs and perform raking movements with the hind legs.</p>
Yawn	<p>Cat opens its mouth widely while inhaling, then closes mouth while exhaling deeply.</p>

* Multiple variations of behavior are possible. The use of modifier(s) to clarify context is especially recommended.

2. Modifiers (three kinds)

The appropriate modifiers may be chosen and inserted into the definitions, again, depending upon the aim of the study. When certain modifiers are used, they may also need to be placed within the title of the behavior for clarity.

General Modifiers

General modifiers are those that identify who or what the cat is directing a behavior towards. They are required for a number of base behaviors, thus, when constructing an ethogram for one's study, the researcher must select the appropriate general modifier for their behavior and insert it into the definition. If the same base behavior is to be used more than once, but with different modifiers, the modifier will change the title of the behavior. Thus for clarity, general modifiers should be placed behind the behavior in parentheses.

For example: **Stare** (object), **stare** (cat), **stare** (human)

Status Modifiers

Status modifiers are those that identify the social status of the cat being observed. Some behaviors exist on the ethogram with the social status already stated or implied (for example: **allogroom**), however researchers may apply a status modifier to various behaviors to indicate if the cat is performing the behavior alone or not. If no status is implied within the behavior on the ethogram, and the researcher has not added a status modifier for clarification, it is always assumed the behavior is performed alone. When used in the title of the behavior, the status modifiers should be placed in front of the behavior and while it is not necessary, it may be helpful to employ both status modifiers if the same behavior is being investigated in both social statuses. For example: "social **patrol**" and "solitary **patrol**," or can simply state "**patrol**" if the cat is alone.

Dispositional Modifiers

Dispositional modifiers are those that identify the nature, or disposition, of the cat at the time a behavior is being performed. When not otherwise specified, it is assumed that all behaviors are performed in a serious or intentional manner. In order to indicate that the cat was performing a behavior in a "non-serious" or playful manner with no intent to harm, the dispositional modifier "play" must be added to the title of the behavior. For example, "**wrestle**" would imply that the cats are having an agonistic interaction, such as while fighting. However "play **wrestle**" would indicate that they were doing it in an amicable manner. Additionally, behavioral states or postural behaviors, such as **lying**, **sitting**, **standing**, may be enhanced with the addition of the dispositional modifiers "alert" or "rest" if desired. Dispositional modifiers should be placed at the front of the behavior.

For example: "play **chase**," "alert **lying**," "rest **sitting**."

Table 2. Descriptions of modifiers to be used in conjunction with base behaviors.

Modifier	Description
General	
<i>Cat</i>	Another individual of the same species (i.e. conspecific). Additional information can be provided to explain the relationship between individuals by labeling the cat using broad titles (e.g. "mother," "new individual," "breeding partner," "offspring"). The common name for the study species can be used in lieu of "cat."
<i>Human</i>	Any human involved with the study. For additional clarity, broad titles for caregivers can be used, (e.g. "observer," "keeper," or "owner").
<i>Object</i>	Any object the cat appears focused on and/or is in contact with. For additional clarity, broad titles for objects can be used (e.g. "branch," "mesh," "ball").

<i>Surface</i>	Any external surface that the cat appears focused on and/or is in contact with, whether it is horizontal or vertical.
Status	
<i>Social</i>	Cat is in close proximity of another individual.*
<i>Solitary</i>	Cat is alone.
Dispositional	
<i>Alert</i>	Cat is vigilant and attentive to surroundings, with eyes open, ears forward, mouth closed or slightly open, and head up. Cat's eyes may be focused in a specific direction, or scanning the area accompanied by head and possibly ear movement.
<i>Rest</i>	Cat is stationary and generally inactive, typically in a lying or sitting posture. Eyes may be closed or open, and head may be up or down and performing minimal movement.
<i>Play</i>	Cat is performing a behavior in a "non-serious" or playful manner. (Recommended for use when distinguishing between affiliative and aggressive or agonistic social interactions). Observer must have certainty that the cat has no intention to harm. May look for facial expressions indicating play, such as mouth slightly open without showing teeth, ears and eyes appear relaxed or fairly alert (Estes, 1991).

*Close proximity may be subject to experimental conditions, however it would typically imply that the cats are within one or two body lengths of each other.

Note when using combinations of modifiers

Numerous combinations of different modifiers can be used as needed. However, if the social status is implied within the definition, as in **copulation** for example, or by a general modifier such as "cat" or "human," it is unnecessary to state both when assigning a behavioral title. For example, if "cat" is included as a general modifier in the definition of **chase**, it is not necessary to state "social **chase**" as the behavioral title. However, if the chasing was in a "non-serious" manner, it should be titled "play **chase**," and would be defined as "Cat runs rapidly in pursuit of another cat." It would be possible to include both types of modifiers in the title if the researcher desired (i.e. "Social play **chase**"), however this may prove redundant and unnecessary in many situations. If the researcher is investigating a single behavior in a number of situations, whereby it may be helpful to state the social status and the general modifier in the title to distinguish between behaviors on the ethogram, then both may be used in the title. For example, if avoidance is being investigated in regards to different stimuli, different titles may include "**avoid** (object)" and "social **avoid**," which could be subdivided into "social **avoid** (cat)" or "social **avoid** (keeper)." As long as consistency is maintained, this can be left up to the preference of the researcher.

3. Behavioral Events and States

Separation of behaviors into events and states will be left to the discretion of the researcher, as it can be dependent upon the objective of one's study. However, measurement of these behaviors should reflect the suggestions made by Altmann (1974), and examples of each can be found below:

- Behavioral Event: Behaviors lasting for a short duration. These behaviors can be scored in intervals by recording each separate occurrence of the behavior.
Examples of behavioral events include: **flehmen**, **lordosis**, **rub** (object), **clawing**, **sniff** (object), social **sniff**, social **roll**, **mount**, and **vocalizations**.

- Behavioral State: Behaviors lasting for a long duration. These behaviors can be scored continuously by recording the length of time the cat spends performing the behavior.
Examples of behavioral states include: **lying**, **pacing**, **running**, **sitting**, **sleeping**, **standing**, and **walking**.