

## General ethograms

This section contains general ethograms adapted from peer-reviewed literature. These ethograms, along with the literature and additional resources, can be used to create a catalogue of behaviours that are relevant to your study:

- [A general ethogram for laboratory mice, rats, golden hamsters, gerbils and guinea pigs.](#)
- [A basic ethogram for laboratory rats, including interaction with an enrichment object.](#)
- [A general ethogram for zebrafish behaviour, including interactions with enrichment and group level behaviours.](#)
- [An ethogram detailing aggressive displays and interactions in male zebrafish.](#)

### A general ethogram for laboratory mice, rats, golden hamsters, gerbils and guinea pigs

A comprehensive mouse ethogram can be found at [www.mousebehavior.org](http://www.mousebehavior.org).

Behavioural Category	Behaviour	Behavioural elements
<b>Maintenance Behaviour</b>	Sleeping/Resting	Lying with eyes closed.
	Feeding	Handling/manipulating/ingesting food item (including bedding/nesting material and/or faecal pellets).
	Drinking	Drinking from bowl or drinker.
	Self-grooming	Licking and nibbling directed towards all of own body surfaces carried out using the mouth/tongue and/or front paws.
	General non-intake maintenance	Yawning, stretching, scratching and sneezing.
	Elimination Behaviour	Urination and defaecation.
	Gnawing/Chewing	Using teeth to gnaw and chew at objects within the cage, excluding cage bars (see 'Bar Chewing').
<b>General Activity</b>	Lying Alert	Alert (eyes open) but with no directed attention, while lying.
	Stationary Alert	Alert (eyes open) but with no directed attention, while sitting, standing, or leaning against the cage side or an object within the cage. Body relaxed and immobile.

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<b>Behavioural Category</b>	<b>Behaviour</b>	<b>Behavioural elements</b>
<b>General Activity (cont.)</b>	Movement	Walking, hopping, running or jumping.
	Digging/Burrowing	Digging in the floor substrate/litter material (e.g. wood chip) with both forepaws, interspersed with kicking movements of hind legs.
	Nest-building	Constructing somewhere to sleep from nesting material (e.g. shredded paper) using both mouth and forepaws. This includes collecting nest material and transferring it to nest site.
	Non-social Sniffing/Exploration	Sniffing movements with nose applied to any part of the cage/air/bedding material/nesting material/ground/other objects within the cage.
	Climb	Non-repetitive climbing on any part of the cage or object within the cage (see 'Stereotypic Behaviour').
	Rearing	Sitting on hind limbs with forepaws off the ground, and stretching up without leaning on cage side or any other object.
	Freezing	Animal remains motionless when disturbed. Body is stiff (non-relaxed), and animal highly alert with attention directed towards cause of disturbance.
	Flee/Run away	Moves rapidly away from potential or real threat.
	Food Hoarding	The removal of food from the food bowl for storage elsewhere.
	Foraging	Searching for food items (if present) within litter/nesting material.
<b>Social Behaviour</b>	Social Sniffing/Investigation	Sniffing/nosing any part of another individual.
	Agonism (incorporating both offensive and defensive behaviour)	Threat/thrust (rapid head and fore-body movements towards another animal); upright or sideways posture; pushing/boxing/pawing one another with forepaws; wrestling; pinning down or being pinned down on-back or side; standing/leaning over or defensive crouch; chasing or being chased; biting or being bitten; pilo-erection ; vocalisation.
	Aggressive Groom	Vigorous pulling (always unidirectional) of another individual's fur with teeth, focused on the head and shoulders region, following an aggressive interaction. Groomer stands/leans over the other individual who may be crouched or on-back, and subjects them to enforced grooming.

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<b>Behavioural Category</b>	<b>Behaviour</b>	<b>Behavioural elements</b>
<b>Social Behaviour (cont.)</b>	Allogroom	Gentle grooming (sometimes reciprocal) of any part of another individual. Engaging in allogrooming is voluntary and may be solicited.
	Vocalisation	Calls of varying frequency (including ultrasonic) emitted in different contexts. Can include teeth chattering/grinding.
	Play	Play behaviour contains the same behavioural elements as agonism, but is less intense, does not include injurious biting and pilo-erection and is not followed by aggressive grooming.
	Scent Marking	Animal rubs and draws flank along the side of the cage or on other objects within its environment.
<b>Reproductive/Sexual Behaviour</b>	Mating Behaviour	A sequence of: approach; sniff; follow; male soliciting behaviour (e.g. guinea-pig 'rumba': rhythmic oscillation of hindquarters, alternate lifting of hind legs and rumbling vocalisation); female soliciting behaviour (e.g. rats: hopping and darting movements with ear-wiggling); attempted mounting; presentation (e.g. lordosis: crouched/lowered body position, with hindquarters raised); mounting; copulation; vocalisation; post-copulation grooming of sexual organs.
	Parental Behaviour	Nursing/suckling, carrying and grooming of offspring.
	Bar Chewing	Using teeth to gnaw/chew/bite repetitively at the wire bars of the cage.
<b>Abnormal Behaviour</b>	Barbering	When the fur and/or whiskers are plucked, either by another individual or by self, resulting in bald patches.
	Stereotypic Behaviour	Repetitive, unchanging and apparently functionless behaviour, including: bar circling in mice (repeatedly tracing a circle on the cage bars with forepaws and body); bar wheeling in mice (repeated movement from the cage bars to the cage floor); extended periods of digging/scratching in cage corners (gerbils).
	Out of Sight	Behaviour of the focal animal cannot currently be observed (e.g. in shelter).
<b>Other Behaviour</b>	Other	Unexpected, or non-focus behaviour, not otherwise included in the ethogram.

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## A basic ethogram for laboratory rats, including interaction with an enrichment object

An ethogram outlining positive and negative social behaviours in wild rats can be found in [Schweinfurth \(2020\)](#).

Code	Behaviour	Behavioural elements
SL	Sleep	Lying with eyes closed
ST	Stationary	Immobile but alert (eyes open) with no directed attention while lying, sitting, standing, rearing or leaning.
M	Movement	Walking, rearing, jumping or running.
F	Intake maintenance	Eating food or faecal pellet, or drinking.
G	Non-intake maintenance	Grooming, yawning, stretching, sneezing, scratching, urinating or defecating.
SI	Social investigation	Sniffing any part of another individual
A	Agonism	Upright posture, box/push, wrestle, stand over or defensive crouch, pin down or pinned on-back, bite or being bitten, chase or being chased.
B	Bedding/nesting material manipulation	Sniffing, digging in, handling, or eating the floor substrate/litter material.
AL	Allogroom	Gently grooming any part of another individual.
O	Out of sight	Behaviour of rat unable to be observed.
Oth	Other	Other behaviour
S	Sniff cage roof/wall or air outside of cage	Nose applied to cage roof, wall or outside the cage, making sniffing movements.
Sz	Sneeze	An involuntary expulsion of air from the mouth and nose due to irritation of the nostrils [1].
C	Climb	Climbing on any part of the cage (e.g. roof).
AB	Abnormal behaviour	Bar chewing: gnawing/biting at wire bars of the cage.
AG	Aggressive groom	Aggressive grooming of another individual following agonism.
E	Enrichment	Any interaction with enrichment object, including: chewing; climbing on; sniffing; or scent marking.

[1] Observing the frequency of sneezing and the duration of sneezing bouts can be used to assess the suitability of bedding material in terms of respiratory health (Burn et al. 2006).

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## A general ethogram for zebrafish behaviour, including interactions with enrichment and group level behaviours

A comprehensive ethogram of zebrafish, at larval and adult stage, can be found in [Kalueff et al. \(2013\)](#).

Behaviour	Description	Code
<b>Movement and position (for individual fish)</b>		
<b>Calm swimming</b>	Continuous swimming with gentle turns, positioned mainly in mid water.	CSw
<b>Erratic swimming</b>	Bursts of darting movements with sharp turns. The body may form a C shape.	ESw
<b>Freeze</b>	Immobile, often at bottom of the tank. Frequent opercular movements. Often follows a sudden darting movement or a burst of erratic swimming, occurring in response to a stressful stimulus.	Fz
<b>Social</b>		
<b>Chase</b>	Movement towards a second fish, increasing acceleration, while second fish avoids the first.	Ch
<b>Escape</b>	Engaged in chase, swimming away from a dominant pursuer.	Es
<b>Follow</b>	Similar to chase without increase acceleration, non-aggressive.	Fo
<b>Attack</b>	Short bouts of fast swimming directed at an opponent, accompanied by mouth opening behaviour and biting.	At
<b>Strike</b>	Similar to attack without any physical contact being made. High velocity, aggressive lunges towards another individual.	Sk
<b>Tail-nose touch</b>	Touching the side or tail of another fish with the nose or head. A non-aggressive social interaction commonly seen during social interaction such as courtship.	TN
<b>Enrichment focused (for individual fish)</b>		
<b>Associate</b>	Moves towards or spends time in close proximity or in contact the enrichment. Can be assessed by measuring the latency and time spent/frequency of contacting the novel object.	As
<b>Avoid</b>	Does not come into close proximity with the item. Can be assessed as Associate.	Av
<b>Hide</b>	Retreats to item in response to a negative stimulus, such as being chased, this may be underneath or behind an object or within fronds of plant.	Hi
<b>Guard</b>	Guards an object or area of the tank, will chase, strike or attack fish that trespassers into the guarded territory.	Gu
<b>Rheotaxis</b>	Orients towards and swims against the water current (positive rheotaxis), also evident by avoidance of sucking source (e.g. pump, inlet).	Rh
<b>Predatory</b>	Bites/consumes prey.	Pr

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Behaviour	Description	Code
<b>Group level behaviour</b>		
<b>Compaction</b>	Individuals form a tight shoal, reducing the distance between themselves and their nearest neighbours. Typically occurs in response to a perceived threat or unfamiliar surroundings.	Com
<b>Inspection</b>	An individual, or individuals, leave the shoal and approach the enrichment before returning to the shoal.	Ins
<b>Dispersion</b>	Rapid, erratic swimming behaviour of multiple fish moving away from each other, could be followed by individuals hiding or freezing before reuniting with the shoal. Typically occurs in response to a perceived threat.	Dis

## An ethogram detailing aggressive displays and interactions in male zebrafish

This ethogram is adapted from [Oliveira et al. \(2011\)](#). An aggressive interaction may contain all of the behaviours shown below, occurring in the order that they appear.

Behaviour	Description
<b>Display</b>	In short distance of the opponent, usually less than one body length, the fish erects its dorsal and anal fins and flares its body flank towards the opponent.
<b>Circle</b>	Two fish approach each other in antiparallel positions with their fins erected and circle one another ascending in the water column. This can last from a few seconds to a few minutes.
<b>Strike</b>	The fish swims rapidly towards the opponent, but no physical contact occurs.
<b>Bite</b>	Fish opens and closes its mouth in contact with the body surface of the opponent. This is usually directed at the ventral or posterior parts of the target fish.
<b>Chase</b>	Similar to strike but with an active pursuit by the aggressor. This behaviour stops when one fish stops chasing and/or the other fish freezes.
<b>Retreat</b>	Fish swims rapidly away from the opponents in response to a strike or a bite.
<b>Flee</b>	Continues escape reaction in response to a chase. Fish swims rapidly away from the aggressor.
<b>Freeze</b>	Fish stays immobile with all fins retracted and the caudal region downward near the bottom or surface of the aquaria.

## References

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