

COMPILATION OF GORILLA ETHOGRAMS

Compiled by:

Gorilla Behavior Advisory Group,
affiliated with the Gorilla SSP

Jackie Ogden, Zoo Atlanta and Georgia Institute of Technology
Deborah Schildkraut, Ph.D., Boston MetroParks Zoos
Co-chairs

Anne Baker, Ph.D., Brookfield Zoo
Benjamin B. Beck, Ph.D., National Zoo
Cynthia Bennett, Ph.D., Dallas Zoo
Thaya duBois, Los Angeles Zoo
Cathleen Cox, Ph.D., Los Angeles Zoo
Ken Gold, Zoo Atlanta and Georgia Institute of Technology
Donna Fernandes, Ph.D., MetroParks Zoos, Boston
Carol Glick, Arizona State University
Ingrid Porton, St. Louis Zoo
Jill Mellen, Ph.D., Washington Park Zoo, Consultant

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The Gorilla Behavior Advisory Group (GBAG) would like to gratefully acknowledge all those researchers who gave permission to include their ethograms in this compilation, as well as those who had previously published their ethograms. Additionally, GBAG would like to thank the Gorilla SSP Group for their sanction. Each ethogram is listed under the name of the respective author(s), with either the author's affiliation or the reference from which it was taken. The majority of these ethograms were, of course, built upon previous work of other researchers. Any typographical errors or errors of interpretation are of course the responsibility of the compilers, not the respective authors. This work represents a compilation, not a recommendation of any particular ethogram. Although an attempt was made, this compilation is by no means exhaustive. Copies of this compilation are available for \$5.00, either on disk or in text form, or for \$2.00 if disk is provided. Please contact: Jackie Ogden, Zoo Atlanta, 800 Cherokee Avenue SE, Atlanta; GA 30315. Checks should be made payable to the Atlanta/Fulton County Zoo.

updated January, 1991

Beck, B. Phase 1: National Zoo, Gorilla Research Project (study at Brookfield Zoo).

Purpose: To compile data on the social behavior and social structure of gorilla groupings to better inform management decisions and to plan strategies for reproduction.

Sampling methods: Scans of location and activity (5 minute intervals). Other behaviors, all occurrences.

Ethogram key words: Activity budgets/General behaviors, Social behavior.

Behaviors:

Activity:

Lie: Being recumbent with little or no weight being borne on hands or feet.

Sit: Bearing most weight on buttocks.

Stand still: Bearing weight on feet quadrupedally or bipedally with hands holding on to mesh, glass, tree, etc.

Locomote: Walking, running, or climbing.

?: If activity can't be scored.

Other behaviors:

Rest Near: Sitting or lying within arm's reach of another for at least 10 seconds. Initiator is second animal to rest. The receiver must be relatively immobile but need not be resting.

Groom: Directed touching, licking, or intense visual inspection of another's (GO) or own skin (GS) or pelage. Scratching excluded.

Intimidation display: Resting on chest or abdomen, beating on cage surface, rapid exaggerated running or strutting, pursed lips, and/or exaggerated throwing or shoving of objects. Score when any two or more of these behaviors occur simultaneously or sequentially. Score initiator only.

Rough-up: Slapping, poking, elbowing, punching, hair pulling, pushing, shoving, or wrestling when not in play or sexual context.

Aggressive bite: Biting when not in play.

Crouch: Initiator lowers ventrum toward or to substrate, or curls fetally on substrate. Event terminated when normal locomotor or resting posture resumed.

Inspect genitalia: Sniffing, touching, or intense visual inspection of another's genitalia or own genitalia.

- Sex solicit:** Female purses lips and stares at/follows/reaches toward male. Event terminated when lips relax for at least 10 seconds.
- Copulation:** Dorso-ventral mounting or ventro-ventral mounting with pelvic thrusting. Event terminated when either animal breaks bodily contact. Note if intromission confirmed (very difficult) or if semen observed afterward on penis or vagina.
- Masturbate:** Rhythmic rubbing of genitalia with any part of own body (e.g., fingers, toe), or against inanimate object.
- Yawn:** Per usual definition. Score each yawn.
- Feces:** Manipulation or mouthing of own or another's feces. Note whose feces if possible. Note "eat" if fecal material actually ingested.
- Regurgitate:** Vomiting into mouth, hand, or onto substrate; note if reswallowed.
- Termination of behavior:** Termination of yawn, crouch, sex solicit and copulation is specified in definition of those patterns. For all other patterns, an event is terminated when discontinued for 10 or more seconds or if the participating animal(s) engage in another scored pattern within 10 seconds. However, Rest Near is not rescored until one partner moves out of arm's reach for 10 seconds regardless of concomitant behavior.

Beck, B. Phase 2: National Zoo, Gorilla Research Project (study at Brookfield).

Purpose: To study social development of captive-born lowland gorilla infants being mother-raised in a group.

Sampling methods: 1-0 sampling at 60 seconds intervals. Note occurrence of rough-up, aggressive bite, or crouch by putting initiator-receiver letter codes.

Ethogram key words: Development.

Behaviors:

Infant location relative to other animals:

Contact: In physical contact with mother, whether carried or simply touching.

Other contact: Any physical contact between infant and nonmother.

Proximate: Within arm's reach of other animal, but only when not in contact with mother.

Distant: Beyond arm's reach but less than 15 feet of other animal, but only when not in contact with mother.

Independence:

Nursing: Infant's mouth on mother's nipple, with or without actual suckling.

Eating: Infant puts any solid food (including hay) into its own mouth, with or without actual chewing or swallowing.

Wean: Mother actively terminates or prevents nursing.

Struggle: Infant trying to break contact with mother while being restrained by her.

Play: Low intensity slapping, wrestling, or mouthing when initiator has slack lips or "smile."

Aggressive behavior:

Rough-up: Slapping, poking, elbowing, punching, hair pulling, holding, or wrestling, when not in play.

Aggressive bite: Biting, when not in play.

Crouch: Initiator lowers ventrum toward or to substrate, or curls fetally on substrate.

- Copulation: Dorso-ventral mounting or ventro-ventral mounting with pelvic thrusting. Event terminated when either animal breaks bodily contact. Note if intromission confirmed (very difficult) or if semen observed afterward on penis or vagina.
- Masturbate: Rhythmic rubbing of genitalia with any part of own body (e.g., fingers, toe), or against inanimate object.

Bennett, C. and Fried, J. (1990) Dallas Zoo. Gorilla Ethology Study.

Purpose: To investigate the effects of exhibit modifications on gorilla activity budgets.

Sampling: 15 minute focal sampling, with scan sampling at 15 minute intervals of all individuals.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Post-occupancy evaluation, Display/Agonistic behavior, Abnormal/Stereotypic behavior.

Behaviors:

Locomotion:

Walk: Individual travels from one location to another by using two, three, or four limbs to propel the body. Two or three limbs are always on the ground at one time.

Walk quadrupedal: The animal uses all four limbs to travel forwards, backwards, or to the side. Leg movement is transverse (i.e., left forefoot and right hindfoot moving together, then right forefoot and left hindfoot moving together). Gorillas primarily knucklewalk, but occasionally walk on the sides of closed fists.

Walk bipedal: In this form of locomotion, the torso is perpendicular to the ground. Travel is executed by using hind limbs alone. Legs are extended and support the body. Forward motion of the legs comes more from a forward and backward rocking of the pelvis rather than rotational movements in the hip joints. Arms are usually held close to the side or are wrapped around the torso. Sometimes, individuals walk bipedally for short distances while holding onto a structure (i.e., cage bars, bench, door frame edge, ropes, trees, vines) or while carrying object(s).

Run: Three gaits can be observed: transverse quadrupedal, lateral quadrupedal (gallop) and bipedal. Regardless of the gait; none, only one, or two limbs will be on the ground at a time. Bipedal run is achieved by slightly elevating the torso and lifting the arms during a transverse run. This usually occurs within aggressive display sequences or bouts of play behavior.

Slide: Occurs at end of a run. The animal remains quadrupedal but stops the running motion while keeping the limbs rigid. The body might be turned at an angle to the direction of travel. A slide may be terminated by the presence of cage bars, wall, limbs, etc.

- Arm over arm swing: An animal grasps an overhead structure with its hands. The arms are nearly fully or fully extended. The animal releases one hand and pivots the body forward from the still grasping hand while extending the other hand to grasp a structure. It then pivots the body forward. Swinging movements are slow and deliberate. Reminiscent of brachiation.
- Skip: Not observed in Dallas animals.
- Swing: Not observed in Dallas animals.
- Circle: Not observed in Dallas animals.
- Scoot: Two forms of scoot have been observed, and both occur with the animal in the squat position. One is a wobble like movement, where the animal leans from side to side while swinging the elevated side of the body forward. This can be done with the arms crossed on the chest or resting on the knees, but the arms could be used to pull the animal along while it moves next to the cage bars or ropes. The second form is characterized by use of the arms in a crutch like manner. The arms are placed on the ground in front of the body. With the arms rigid and braced on the ground by tightly closed fists, the body is pivoted forward by swinging between the arms. Both modes of scoot are primarily used for short distance travel, but individuals have been observed to travel up to twelve feet in this manner.
- Climb: Gorillas are methodical climbers moving carefully and always having two limbs in contact with a structure at any one time. The type of structure being climbed appears to influence the specific climbing movements used. When climbing cage bars, wood ties, or trees, movement of the limbs is basically transverse quadrupedal (transverse limbs may move together or in series). When climbing up ropes or horizontal bars, an animal may grasp them with its forelimbs and partially swing its body up off of the ground until the hindlimbs can also grasp or lean on the structure, thereby assisting the forelimbs in pulling the body up.
- Inactive:*
- Sit: Basically, sitting consists of: torso erect, not in contact with ground, resting platform, substrate, etc.; buttock on ground, legs in front or to the side of the body. Several variations of sitting postures are regularly displayed:
- Legs: bent acutely at the knees, rotated outwards from body (outer thighs are close to the ground), and crossed at the ankles or shins (aka: Indian style). The legs can also be extended forward and crossed at ankles, bent with knee(s) up and foot/feet flat on ground, legs extended and near parallel, or extended and split apart up to a 90 degree angle;

Arms/hands: crossed on chest, crossed or lying in lap, gripping feet, resting on knee(s), or extended with knuckles resting on ground for additional support. Animals will frequently hold on to structure (i.e., ropes, cage bars, cross-ties) or rest limbs on it.

Torso: upright almost perpendicular to the floor, angled acutely forward over legs at about a 45 degree angle or less to the floor, or leaning to the side supported by structure, object, or extended arm. Record as torso upright, torso hunched over, or back, side or arms supported.

Squat:

In this posture, legs are acutely bent at the knees and thighs, with the feet under the body and heels tucked into the buttocks. Feet and legs bear the bulk of the weight and can be in front of the body or to the side. Buttock does not contact surface. A squat position is assumed when the animals defecate or urinate (see Elimination category). There are several variations of the squat position:

Legs - Knees are bent and can be tucked up in front of the chest or angled outwards until they form an almost straight line with the body.

Arms - Forearms or elbows are frequently resting on knees, thighs or holding onto a structure (i.e., cagebars), but may also be crossed on chest or extended to the ground for additional support.

Torso - Squatting animals will frequently have their backs upright against a structure (i.e., cage bars, walls, concrete posts). When supported by arms extended out, the torso may be bent at a 10 to 15 degree angle.

Perch:

Animals assume a squat posture when they are off of the ground. The feet are used for grasping surfaces.

Legs/feet - Grasp structure with feet side by side or one in front of the other.

Arms/hands - Grasp same structure/object or nearby structure/object with hand(s) for additional support.

Lie:

In this posture, the body is in a recumbent, prostrate position. The body can be dorsally, ventrally, or laterally recumbent. Variations within these positions include:

Ventral:

Primarily the ventrum is on the resting surface.

Variations of ventrum include:

Arm(s) - May rest chin on forearm or hand.

Legs - May be bent at knees and tucked under the body or hips may be rotated so both legs lay out to the side.

Dorsal:

Primarily the back is on the resting surface. Variations of dorsal include:

Arms/hands - Are frequently folded across the chest or are elevated with the elbows extended out and hands resting on the head. Occasionally, the arms are extended outwards and are grasping a structure.

Legs/feet - May be crossed at ankles or knees, sometimes an ankle may rest on opposite knee. The feet may be gripping an object or could be propped up against a structure. Sometimes, legs may just stick up in the air at a 90 degree angle to the plane of body. Foot-foot and hand-foot grasping occurs frequently.

Lateral:

Primarily the left or right side of the torso is on resting surface. Variations include:

Arms/hands - May be folded on chest, lying along length of body or one/both arm(s) may be bent up under head as a "pillow."

Legs/feet - Are usually bent at knees, pulled up towards the body, and laid one on top of the other. The legs also can be crossed at knees or ankles. Foot-foot and hand-foot grasping occurs frequently.

Torso - The back may be against an object or unsupported.

Stand:

Outstretched or extended arms and/or legs are in contact with a surface and bear body weight. Stand, like sit and lie, can take several forms.

Stand quadrupedally:

All four limbs are extended, are in contact with a surface, and support the body weight. The torso is generally parallel to the ground. Animals will stand on knuckles or on closed fists; on flat feet with thumbs extended or on the side of the feet. Variations on the basic quadrupedal stance can be identified as threat behavior (see descriptions on agonistic behavior).

Stand bipedally:

The torso is in an upright or nearly upright position (perpendicular to the ground). The legs support the body, are widely spaced, and bowed or slightly bent. The feet are turned out, and thumbs extended out from foot. There is no other support.

Stand supported:

The animal is in a bipedal or monopedal position with the torso perpendicular or even parallel to the ground. The weight is supported by the legs, hands, or arms, which may be grasping or resting on some structure.

Environmental exploration:

Survey:

Visual:

Animal stops an ongoing behavior or is engaged in no other behavior and orients head and eyes toward a specific direction or component of the environment. This orientation can be prolonged (greater than 2 sec).

Visual side glance:

The animal repeatedly shifts its eyes to the side and focuses momentarily on components of the environment. The head is stationary and may be oriented away from the object(s) of scrutiny.

- Inspect:** Includes both tactile and olfactory components. The animal reaches out and touches an object with its knuckle(s) or forefingers. The digit(s) are then brought to the nose and apparently sniffed.
- Olfactory:** An animal brings the nose close to an object or the object near the nose and sniffs.
- Gustatory:** An animal licks an object, places it momentarily in the mouth or between the lips, or touches something then places fingers in the mouth.
- Object manipulation:**
- Object-gather:** An animal accumulates objects that are dispersed and brings them to a central location.
- Object-dissemble:** Involves a wide variety of actions where the hands, feet, and mouth, are used to rip, shred, twist apart, remove components, or peel an object (normally inanimate, but not necessarily).
- Object hold:** An animal is inactive/idle with an object resting in the hand, foot, mouth, or pressed against the body. No other manipulation is occurring.
- Object carry:** An animal uses its hands, mouth, legs, and/or feet to transport an object. Objects may also be carried by tucking them between the thigh and belly.
- Object rigid manipulation:** An animal uses an object to rattle, shake, bang, or pound.
- Object use:** Involves utilizing objects which are not permanent fixtures for a number of different purposes: use of an object as an extension of the body in order to attain an immediate goal (tool), to increase comfort (furniture, nest), as covering, as a weapon, etc.
- Object varied or non-specific manipulation:** This is a catch all category that includes touching, pushing, absently rocking, bending, lip rolling, etc.
- Auto involved: Manipulate, eliminate, play, ingest:*
- Manipulate:**
- Autogroom:** Animal uses fingers and/or lips and teeth to manipulate and remove items from its fur.
- Autopick:** Animal uses fingers and/or lips to pick debris from its teeth, nails, nose, ears, and eyes.
- Probe anus:** Animal uses fingers to poke at or rub its anal region.
- Masturbate:** Self-stimulation of genitalia.

- Manual:** Animal manipulates its genitals with its hands or feet.
- Pelvic rub:** Female backs up to an object and rubs anogenital area against it.
- Haunch bounce:** From a squatting position animal bounces up and down on haunches. Males may create a false vagina with hands and haunch bounce while directing the penis into the hands.
- Autoinspect:** Animal makes a close visual or olfactory examination of own body parts.
- Comfort:** Comfort movements consist of brief, transitory movements such as changes in posture; e.g., rolling over and changing orientation of limbs; and attempts to ease or relieve an uncomfortable situation; e.g., stretching, scratching, yawning, coughing, clearing the throat, etc.
- Eliminate:**
- Urinate:** Expel urine. Animals assume a squat position with torso tipped forward and weight on its arms which are extended in front of the body.
- Defecate:** Expel feces. Position during defecation is similar to that described for urinate. Animals may urinate and defecate at the same time.
- Regurgitate:** To eject part or all of the stomach contents through the mouth, usually in a series of involuntary spasms. However, gorillas seem to have a high degree of control over regurgitation. Record this only if the animal regurgitates but does not reingest vomitus.
- Play:** Lone play includes repetitive, exaggerated, disjointed, and seemingly nonpurposeful behavior. When alone, such behavior usually involves an inanimate object or consists of repetitive movements accompanied by a play face.
- Object:** Shake, bounce, hit, juggle item, hug, rub, swing, toss in air. Movement is exaggerated. Water can be considered to be an object.
- Peregration or locomotor play:** Clap, rock, somersault, shake, twist, run, slap, pat, circle, lip flap.
- Body oriented:** Manipulate body part, exaggerated head and/or body rubbing, pulling of extremities, etc.- chest beat.
- Ingest:** Includes a wide array of behavior associated with the location, procurement, processing, and consumption of items.

- Forage:** Manipulation of substrate or objects in the environment which results in obtaining food items (substrate is frequently edible itself). This includes the periodic transfer of food from hand/foot to mouth and travel of one or two steps between searches. Several foraging motions can be used. For example, animals may sweep an arm from side to side and move substrate with the back of the hand or pick up the substrate and place or throw it aside, or a substrate might be picked up and held while an animal forages through it. To pick up food items, animals will use a finger pinch (forefinger or middle finger and thumb or tip of forefinger or middle finger for small forage items). A variety of postures may also be assumed while an animal forages: tripedal with free arm foraging, sitting, squatting, or lying ventrally while resting on forearm(s) or elbow(s).
- Food carry:** Travel while holding food items. Food can be carried by mouth, hand, feet, in the crook of the arm, against the chest, against the stomach, or any combination of these methods. Animals walk bipedally (rarely), tripedally (most commonly), or quadrupedally. Animals will knuckle walk with food in their hands or will walk on the back of the hands/wrists while holding food. When climbing, animals will frequently carry food in their mouths. Animals may also scoot along for short distances while carrying food.
- Food gather:** See object gather.
- Food process:** Various manipulations of food items (provisions, browse, bedding) that give an animal access to an otherwise inaccessible edible or preferred portion. This might involve one or more of the following: stripping (usually length wise), peeling, shredding, breaking apart, husking, shelling, or shaking apart. Each action can be carried out with the teeth, hands, lips, or feet, but usually occur in combination. Visual and olfactory inspection of food frequently occurs during processing. Individuals usually sit while food processing, but will also recline ventrally.
- Food beg:** The animals will extend arms and clap hands together several times or will clap hands together and then open hands palms upwards. Hands are held in a relaxed manner with fingers curled inwards. Knuckles on each hand are actually tapped gently together. If this does not get a response, the animals may rap on the bars or doors. Grunt-like vocalizations may accompany begging. This behavior is usually directed towards a keeper.
- Eat:** Placement of food items in the mouth by hands, feet, or lips followed by chewing and swallowing. "Eat" does not require that a substrate be manipulated in order to obtain food. Visual inspection, olfactory inspection, manipulation, and/or food processing may occur prior to and during eating.

Food may be - regular provisions (record separately), browse or forage (record separately), or body waste (record separately) (excrement, cerumen, nasal mucus, scabs, sweat, dead skin, etc).

Individuals have also been observed to wipe sweat from their arm pits with their hands and then lick their hands.

Drink:

Animals drink from fountains, pools, streams, or from areas where fluid has accumulated. Similar drinking postures are used by the Dallas individuals. From a quadruped stance, an animal either bends forward and places both hands against a wall, fountain edge, or on each side of the body; or crouches down with torso supported by all four bent limbs and ventrum close to the ground. The head is horizontal when drinking. The animals will lick up fluids or suck them directly into the mouth.

Fluids may be - water or juice (record separately), or urine (record separately),

Regurgitate and reingest: Expelling stomach contents through the mouth and then consuming the regurgitate. Specify body position during regurgitate, location regurgitation is deposited in, method of reingest, body position during reingest.

Specify body position while regurgitating:

Tilt position - The legs are straight or slightly bent at the knees. Body is bent at the hips with the torso straight and angled downwards. Body weight is supported by one forearm, both forearms (parallel along the orientation of the body, parallel and running across the chest or crossed across the chest) or one or both arms can be resting with the palms flat on the ground and elbows pointing out to the sides or backwards along the body. The head is lower than the hips. Dallas gorillas will regurgitate onto a surface or into their mouths from this position. The gorillas will assume a tilt posture usually from a sitting or squatting stance. Several head bobs frequently occur prior to regurgitation.

Lie ventral - The animal reclines ventrally on the ground, resting on the forearms (which are held parallel across the chest). Head bobs usually precede regurgitation.

Quadrupedal stance - The animal assumes a quadrupedal stance with legs and arms bent to varying degrees, but the torso remains parallel to the ground. Vomit is forcefully expelled from 1/3 to 1/2 m (1.5 ft) above the receiving surface.

Quick tilt - From a squat or sit position the animal rapidly tilts forwards on its palms then quickly returns to the previous position (looks like a pushup from a sitting position). The gorilla might straighten its back legs a bit when tilting forward but bends them again when it returns to the sit/squat position. Regurgitation is usually into the mouth and reingestion occurs while in the sit/squat position.

Headshake - From a sitting or squatting position the gorilla moves its head to one side and slightly upwards in a somewhat circular motion or quickly up and down. The mouth might open and then close quickly. The movement can be so slight that it may seem as if the gorilla is moving its head in order to relieve a crick in the neck. It may be mistaken for a comfort movement. The gorilla appears to regurgitate into the mouth; cheek bulging and chewing movement can be seen. Vomitus is usually retained in the mouth.

Methods of reingestion:

Reingest with the hand - An animal will dip or run its fingers and whole hand into vomitus and then lick the material off. Usually, the material has a liquid consistency. An animal sometimes uses its hand to scoop and maintain vomitus in small puddle. If the vomitus is thick or chunky, the fingers and thumb, in a pincer motion, are used to pick up matter and transfer it to the mouth.

Reingest with the mouth - Use mouth, lips and tongue to suck, lick, or pick up vomitus.

Positions for reingestion:

Squat on elbows - Feet are flat on the ground, the body is bent forward at the hips so that the ventrum is on the ground. The gorilla is resting on the forearm(s). Hand or mouth will be used to reingest from this position.

Sit/squat - Animal assumes a sit or squat posture (described elsewhere) after the quadrupedal, quick tilt, or head shake regurgitation.

Lie ventral - Similar to the squat on elbows position but the feet are not flat on the ground but extend out from the body. The animal usually rests on the forearms.

Tilt position - This is the same posture as used during the regurgitation phase.

Stereotypic, unusual, aberrant behavior:

- Stereotypic:** Stereotypic behavior is characterized by excessive repetition of or lack of variation in vocalizations, movements, postures, or patterns of travel.
- Stereotypic posture:** Prolonged maintenance of an unusual or bizarre stance, placement of extremities, or attitude. Specify act.
- Stereotypic movement:** Involves body or limb movements but not travel.
- Head circle:** A series of 2-12 unidirectional head rotations which occur most frequently while in a quadrupedal stance with the head, neck, and shoulders oriented towards a corner of an enclosure. The head is only 1/3 to 1/2 m from the wall. This behavior has been observed only in the younger silverbacked male.

- Head swing:** This motion is similar to head circles but the head hangs down and swings back and forth. The head does not make full rotations. It occurs mainly while sideways walking and occasionally while facing the wall or into a corner. This behavior has been observed only in the younger silverbacked male.
- Rock:** Legs are bent and the knees are near chest, arms are on knees or folded across chest. From this position, the animal sways from side to side (movements are no more than 5-10 cm to each side). This is usually done while the animal's back or side is against a vertical structure but has occurred while it is gripping the cage bars with its hands or while perched on a horizontal bar. Rocking occurs in association with finger sucking. This behavior has been observed only in the younger adult female.
- Hand clap:** Hands, with fingers curled in, are brought together rapidly several times. This behavior has been observed only in the younger adult female.
- Stereotypic locomotion:** Repetitive, unvarying, and seemingly meaningless pattern of travel.
- Pace:** Repetitious, patterned and usually unidirectional movement around the exhibit/habitat. The animal seldom makes more than two complete circles about an enclosure. Pacing speed is faster than the usual walking speed. This behavior is seen in the younger silverbacked male and in both adult females.
- Stereotypic self-oriented:** Excessive repetition of an unvarying form of self manipulation or self grooming.
- Finger sucking:** Animal will insert forefinger and/or middle finger of either hand completely into mouth. Seen frequently in association with rocking. Occurs while the animal is in a sitting, squatting, or perched position. Legs are bent up near chest, arms are on knees, or folded across chest. This behavior has been observed only in the younger adult female.
- Belly scratching:** Belly scratching consists of a rhythmic flexion of fingers or up and down movement of wrists so that the fingers are rubbed gently across the stomach region. Hands may alternate scratching, scratch in unison, or scratch singly. The animal will belly scratch while holding straw in the scratching hand.
- The scratching posture is sitting with knees acutely bent and rotated outwards so the soles of feet are flat against each other or legs may be slightly extended with feet gripping cage bars. Seen only in the older adult female.
- Stereotypic object use:** Repetitive, unvarying, and seemingly useless manipulation of an object.

Stereotypic noises
(Auditory):

Repetitive, unvarying, and seemingly useless production of sound. This does not include the occasional production of unusual sounds or noise.

Motor boat sounds: Forcing air through tight lips makes a sound similar to a high pitched motor boat. Emissions are of short duration (\leq 1 sec), but occur in series (one bout had 35). Occurs primarily while the animal is in a resting/idle posture. This behavior has only been observed in the younger silverback male.

Unusual/idiosyncratic:

Lip hang: The lower lip droops loosely down exposing gums and inner lips. This behavior occurs in a variety of contexts, such as after aggressive encounters, during resting periods, during foraging bouts, while locomoting, while manipulating objects, and when head circling or head swinging. This behavior has been observed only in the younger silverbacked male who displays it frequently and incorporates it into many behavior patterns.

Affiliative:

Reproductive/Sexual:

- Precopulatory: Sexual behavior which occurs prior to copulatory mounting.
- Penile erection: There is no mounting. This is *very* difficult to observe.
- Inspect genitalia: Close visual, tactile, or olfactory scrutiny of the genitalia or genital region of another.
- Touch: An animal briefly touches, holds, fondles, or mouths the genitalia of another.
- Olfactory/sniff: An animal leans over and presumably sniffs the genital region of another. Touching another's genitalia and then sniffing the fingers/hand is included in this category.
- Solicit: One animal engages in a variety of postures, gestures, or movements which have a high probability of eliciting sexual behavior from another.
- Stare: Female stands motionless while intensely watching the male.
- Extended arm invitation: Female reaches toward male with arm stretched and palm facing the male.

- Head jerk:** While staring at a male, a female intermittently tosses her head to one side. Her body appears relaxed and the lips are not compressed.
- Present quadrupedal:** Female stands on all four limbs (see stand quadrupedal) and orients her anogenital region directly towards another animal. She may slightly elevate her hindquarters or display a head jerk.
- Back into:** Female first presents and then walks backward into the male.
- Open leg display:** Female slides down past another while her legs are spread widely apart. This behavior occurs in a playful context.
- Crouch:** While in front of another, female bends low to the ground with her limbs pulled underneath her.
- Ground object tap:** While male is oriented towards a female, he repeatedly taps the substrate with the fingertips of both hands.
- Haunch scoot:** While squatting, a female uses her arms to propel herself towards the male.
- Quad-bounce:** While standing on all fours and facing another animal, a female bounces her hindquarters up and down. Similar to a haunch bounce, but done while animal is standing--may be a form of masturbation as well as solicitation.
- Pronk:** While standing quadrupedally and facing another animal, a female hops about in a jerky fashion. The hindquarters are slightly elevated.
- Pronk-mount:** A female pronks while grasping another animal around the waist.
- Play present:** A female presents in an "apparently playful context"?. The angle of bend at the hips is greater than in the other "present" solicit. The female may rest on her forearms and occasionally look backwards (over her shoulder or between her legs) at the male.

Copulatory:

- Mount attempt:** Male attempts to make genital contact with female (in any posture), but the attempt fails.
- Mount:** One animal positions itself on another such that their genitalia are in contact (can be same sexed), mount is of short duration with no pelvic thrust observed. Orientation of mount can be dorso-ventral, ventro-ventral, or ventro-lateral.

- Copulation:** One animal mounts another in any orientation (D/V, V/V, L/V). Mounting is followed by about 30 to 45 sec of position adjustments before pelvic thrusting begins. During copulation the female exhibits compressed lips and the male exhibits pursed lips. The female will occasionally look over her shoulder at the male, and sometimes wave her head side to side with her eyes closed and may emit copulatory whimpers. It is very difficult to observe intromission.
- Reach around:** During copulation, while in the D/V position, the female twists shoulders and neck to look at the male, and reaches back and touches the male on the head.
- Copulatory whimpers:**
- Pursed/compressed lips:**
- Postcopulatory:**
- Touch genitalia:** Visual and tactile inspection of an individual's own genitalia following copulation.
- Vocalization:** After copulation.
- Play:** Repetitive, exaggerated, disjointed, and seemingly nonpurposeful behavior involving two or more individuals. This behavior is accompanied by the "play face" which is characterized by an open mouth which partially exposes the teeth, but the lips are relaxed at the edges. Social play may be accompanied by soft chuckling or a throaty grumbling. Both gentle and aggressive components may be observed, so it is easily confused with aggression (which is generally much louder).
- Contact/direct play:** Two or more individuals are engaged in play involving almost continuous contact. This includes such interactive acts as:
- Stand/climb on, wrestle, slap/beat, tickle, poke, grab, kick, carry, ambush, tag, push/nudge, swat, tap on another, object tug/grab, mouth (specify act).
- No contact/indirect play:** Two or more individuals are involved in play that does not involve direct contact. This could include such acts as:
- Chase, throw at, ground/water slap, object wave/shake/brush on ground, arm shake, chest beat, body slap (own), circle (specify act).
- Solicit play:** One animal engages in a series of postures, movements, or gestures (runaway, swagger, chestbeat) which has a high probability of eliciting play from another.

- Parallel play:** Two animals engage in lone or object play (see those categories) within proximate distance of one another.
- Groom:**
- Allogroom:** One animal manipulates the fur, extremity, or orifice of another. During a grooming episode, the groomer often looks intently at the portion of the body which is being manipulated. Grooming may include both manual and oral components.
- Manual:** Individuals use the fingers and whole hand to manipulate and remove materials.
- Oral:** Use of mouth and lips to manipulate and/or remove materials.
- Mutual groom:** Same as above, except the two animals groom each other simultaneously.
- Allomanipulate:** One animal rubs, pats at, or fondles the fur, orifices, or extremities of another (not including genitalia).
- Social locomotor:** Involves travel while in contact with another.
- Buddywalk:** Animals walking tripedally or bipedally while holding each other across the shoulder or on the hips. This form of travel could involve more than one other individual.
- Carry/cling:** One animal transports or is transported by another:
- Ventral carry/cling:** While standing or moving quadrupedally the focal animal transports another which is hanging on to its ventrum (carry). The walk is quadrupedal or tripedal (if the focal animal is using one of its arms to support the passenger). The focal animal is transported in the manner described above (cling).
- Dorsal or lateral c/c:** While standing or moving quadrupedally, the focal animal transports another on its back, side, neck, shoulders, or head (carry) or is transported by another in this manner (cling).
- Extended arm carry:** An animal carries another (usually an infant) in the palm of the hand and walks either tripedally (carrying the infant football style) or quadrupedally (carrying arm is inverted and weight is on the backside of the hand/wrist).
- Leg drag:** An animal holds onto another's ankle and is pulled along in the direction in which latter animal is traveling.
- General social contact:**
- Active maintenance of contact:** Consists of a group of actions which establish, regulate, or maintain contact with another.

- Withdraw:** One animal moves from within to beyond contact distance of another.
- Approach:** One animal moves from beyond contact distance to within contact distance of another.
- Maintain:** Preserve social distance with a withdrawing animal.
- Follow:** One animal maintains proximity (1-3 BL) with another and simultaneously parallels its route of travel. Delay of follow is minimal.
- Restrain:** One animal physically prevents another from moving out of contact distance.
- Fetch/retrieve:** One animal approaches and makes contact (grasp, pull, push) with a withdrawing animal or one who is beyond social distance (4 m), which results in that individual returning to an original location or group.
- Herd:** An individual guides the movement of an individual or troop by a series of approaches and withdrawals.
- Greet:** Involves a group of actions which occur when individuals are seeing each other for the first time or are entering into the contact distance of one another. These actions are typically brief (momentary to 5 sec).
- Muzzle-muzzle:** One animal places its face within 15 cm of another's muzzle.
- Kiss:** One animal places its lips against the head or face of another.
- Touch:** One animal reaches with any limb and makes contact with another on any part of the body except the genital region. The contact is momentary (1-2 sec).
- Embrace:** One animal wraps arms and/or legs around the body of another. Duration is short (≤ 10 sec).
- Grasp:** One animal momentarily seizes another with the hand(s).
- Offer food:** An animal holds food in the hand and then extends that hand towards another.
- Inactive social contact:** Individuals are inactive, are within social proximity (0-4 m) of one another, and have the option to withdraw from social proximity.
- Huddle:** Two or more individuals are inactive with torsos in direct contact, lateral or ventral. Arms may be wrapped around one another.

- Rest in contact:** Individuals are inactive with some part of the body (exclusive of the position described in huddle) in contact i.e., back to back, toes touching, arms intertwined.
- Rest proximate:** Individuals are inactive, not in contact, but within arms length of one another.
- Rest distal:** Individuals are inactive, not in contact, greater than arms length away but within 4 m of one another.
- Agonistic:**
- Submissive/avoidance:**
- Turn away:** An animal moves its body so that it is oriented away from another, but does not travel.
- Avoid:** An animal moves out of the path of an approaching animal or takes a less direct route around that animal.
- Hide:** An animal removes itself from the view of another. This may occur following an aggressive attack or threat.
- Crouch/crawl:** This behavior can take two forms: 1) An animal bends all four limbs, presses its ventrum to the ground, and may try to travel while in this position; or 2) the animal may crouch while in one of the sitting positions by lowering the head, hunching the shoulders, and often covering the head with an arm.
- Present:** May take two forms. One form is similar to a sexual present, but is much briefer. It may be accompanied by a series of brief glances directed towards the presentee. An animal may also "offer-up" or present an arm to the presentee. (specify act)
- Run away:** An animal moves rapidly (with a running gait) away from another.
- Supplant:**
- Supplant position:** An animal approaches another which then moves away. The former assumes the position of the latter.
- Supplant take object:** An animal takes an object from another or picks up one which was dropped as the former approached.
- Threat:** Posture, facial expression, or movement, usually accompanied by a vocalization, which results in keeping rivals at a distance, obtaining desired objects or space, and controlling another's behavior without undue expenditure of energy or risk of injury (McFarland, 1982, slightly modified).
- Threat:** May appear to be undirected and for our purposes, does not involve movement towards another.

- Stare:** An animal looks towards and fixates on another for an extended time. The brow is furrowed and the face is tense.
- Tight lipped face:** An animal's lips are compressed tightly so that the upper and lower lips protruded somewhat.
- Rigid quadrupedal stance:** An animal assumes a quadrupedal stance, with the legs widely spaced and placed behind the torso. The arms are rigid with elbows rotated outwards, and the weight of the upper body on the knuckles.
- Rigid quadrupedal walk:** From the rigid quadrupedal stand, an animal moves forwards with short stiff steps. The walking speed may be faster than normal, creating a trot like gait. This is undirected.
- Object slap:** An animal slaps ground, rock, wall, tree, door, etc., with the palm or back of the hand. This usually results in a loud sound.
- Head divert:** One animal turns its head away from another in an exaggerated manner and glances repeatedly and rapidly back at them.
- Yawn:** The mouth opens widely, head tips back, lips are pulled back so that the teeth are exposed. Looks like exaggerated form of a yawn.
- Chest beat:** An animal repetitively strikes the chest or belly area with outstretched or cupped hands. The animal is usually bipedal; either walking, running, standing, or standing and rapidly swaying. An animal may also strike his/her chest once with a cupped hand. This can occur in any posture. The chest beat, like all agonistic behavior, may include a vocal component such as a roar or pant hoots. Note: chest beating can be observed in a number of contexts: i.e., lone and social play, reproductive, and agonistic.
- Ground slap:** An animal thumps the ground with one or both hands. The strike may be with open hands, back of hands, or side of closed fists.
- Directed chest beat:** An animal chest beats while oriented towards another.
- Directed object slap:** An animal strikes at an object with an open hand while oriented towards another.
- Open mouth threat:** An animal looks at another and lunges forward with a tense, open-mouthed expression. The lips are raised and pulled back so that the canines are exposed; muscles in the forehead are taut.

- Threat display:** A series of threats, postures, facial expressions, or movements, that are accompanied by a roar, bar, or rumble vocalization. Many of the threat displays include a rapid advance directed towards specific individuals.
- Bluff charge:** An animal runs quadrupedally on the diagonal past another but does not make contact. The bluff charge usually ends in a slide, and may be accompanied by an object flail, drag, or throw.
- Rush charge:** An animal runs quadrupedally towards, but stops just short of another.
- Object grab:** One animal grasps or snatches an object (food, browse, or otherwise) from another.
- Attack:** Includes hostile acts involving active pursuit or physical contact between two individuals.
- Hit:** While rapidly charging towards another (bipedally or quadrupedally), one animal reaches out and strikes the other with an open hand or fist.
- Hit with object:** An animal uses an object to strike out and makes contact with another. This behavior occurs at the end of a charge.
- Hit/slap:** An animal strikes another with its hand(s), but there is not charge component to this behavior.
- Push:** Animal uses arms or legs to forcefully move another away.
- Pull:** An animal grasps another and forcefully moves them closer.
- Chase:** An animal runs in pursuit of another which is rapidly withdrawing.
- Bite:** An animal closes its mouth on the extremities or body of another. Damage may or may not occur.

Author Note:

The authors would like to acknowledge that this ethogram was derived in part from ethograms provided by the Los Angeles Zoo, Zoo Atlanta, and Seattle, as well as through observations of the gorillas located at the Dallas Zoo.

Bowen, R. A. (1980). The behaviour of three hand-reared lowland gorillas (*Gorilla gorilla gorilla*) with emphasis on the response to a change in accommodation. Dodo, R. Jersey Wildlife Preservation Trust, 17, 63-79.

- Purpose:** To measure effects of change in accommodation.
- Sampling methods:** Scans, one minute intervals for one hour periods.
- Ethogram key words:** Activity budgets/General behaviors, Environment change, Influence of.
- Behaviors:** *(full listing available from author)*
- Resting:** Lying, sitting, standing, clinging and hanging, except when accompanied by any other behavior; thus leaving only those occasions on which the animal was sedentary in both gross and local terms (apart from visual behavior or gestures).
- Gross locomotion:** Walking, running, climbing, brachiating, swinging, rolling, and wrestling.
- Local manipulation:** Manipulating with hands or feet, mouthing, scratching, hairplucking, grooming, nose-picking, coprophagy, drinking water or urine, foraging, feeding, and mauling (gentle wrestling).
- Social play:** Wrestling, mauling, sparring, chasing and social grooming.
- Self-directed:** Grooming, scratching, plucking hairs and nose-picking.
- Visual:** Watching, looking at, and glancing at one another.
- Gestures:** Including facial expressions (play face and fear grin), playing-walking/running, tapping and slapping objects/substrate, chest beating and patting parts of the body.
- Public-oriented:** Watching or interacting with members of the public, by throwing items of food or play objects, for example.
- Feeding:** Eating, drinking, foraging for food, coprophagy and drinking urine.
- Stereotyped:** 'Rocking' and 'shuffling.' These are behavioural abnormalities peculiar to captivity in which the animal sits, sometimes holding a quantity of wood-wool or similar nesting material, and either rocks back and forth with it in a sort of scrubbing motion, or shuffles backwards with it, using the hands placed on the surface in front as a means of propulsion.

Brown, S. G. (1988). Play behaviour in lowland gorillas: Age differences, sex differences, and possible functions. Primates, 29(2):219-228.

Purpose: To document play in a large sample of gorilla groups, in order to better understand the possible functions of social play in gorillas.

Sampling: Frequencies recorded.

Ethogram key words: Social behavior.

Behaviors:

Solitary play:

Rotational/locomotor:

- Twirl: Spinning around bipedally.
- Somersault: Turning the body one full rotation head over heels.
- Roll: Turning the body from side to side while supine; can be complete or incomplete rotation.
- Run: Loose limbed gait, usually bipedal.
- Self: Slapping the face, clapping hands, or rubbing oneself without grooming.

Object play: Play with inanimate objects and other species.

- Climb/swing: From a tree, boulder, or ledge.
- Manipulate: An external object such as grass, dirt, or a branch.
- Throw: An external object while in a relaxed stance.
- Swing: An external object while in a relaxed stance.
- Water: Water is used in the play sequence.

Social play:

Moderate play:

- Open-mouth-wrestling: Limbs entwined while sitting or laying; gorillas roll/twist together placing open mouths on each other.

Active play:

- Rough/tumble: Vigorous bipedal wrestling.
- Chasing: One gorilla rapidly following another, both with relaxed running gaits.

Chest-pounding

duBois, T., Mead, J., & Cox, C. Lowland gorillas: Ethogram. Los Angeles Zoo.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Display/Agonistic behavior, Abnormal/Stereotypic behavior, Development, Maternal behavior, Vocalizations.

Behaviors:

Masturbation:

- Manual:** An animal rubs its genitals repeatedly with hands.
- Pelvic rub:** A female backs up to an object (tree, rock, etc.) and rubs anogenital area against it.
- Haunch-bounce:** While in a squatting position, a female bounces up and down on her haunches. (Referred to as Evie's "hiccuping.")
- Coo vocalization:** Pursed lip vocalization sometimes given when female's masturbate.

Sexual behavior:

- Anogenital touch:** An animal examines or fondles the anogenital region of another.
- Anogenital sniff:** An animal sniffs the anogenital region of another, excluding occasions when the latter animal has just defecated or has feces on fur.
- Stare:** A female stands motionless while intensely observing the male.
- Head jerk:** While staring, a female intermittently jerks head to the side. The body is relaxed and lips are not compressed. (Referred to as "the come hither look".)
- Extended arm invitation:** A female extends her arm with open palm toward the male.
- Ground or object tap:** While orienting toward the male, a female repeatedly taps ground, rock or log with both hands (as if playing a drum).
- Haunch-scoot:** While squatting, a female uses her arms to propel herself on her haunches toward the male.
- Quadrupedal-bounce:** While standing on all fours and facing another animal, a female bounces hindquarters up and down. (Similar to haunch-bounce but done while animal is standing - may be form of masturbation as well as sexual solicitation.)
- Pronk:** While standing on all fours and facing another animal, a female hops about in a jerky fashion. The hindquarters tend to be slightly elevated. (Behavior "invented" by Cleo.)

- Pronk-mount:** A female pronks while grasping another animal around the waist.
- Present:** A female stands quadrupedally and orients anogenital region directly toward another animal; hindquarters are slightly elevated (but not an exaggerated display as in some primates).
- Back-into:** While presenting, a female walks backwards directly into another animal.
- Play-present:** A female presents in a playful context. Form is generally exaggerated, e.g., animal bends way over with head close to ground and rump in the air. (May occur only in young animals.)
- Spread-legs display:** A female slides on an incline past another with legs spread widely apart. Occurs in a playful context.
- Crouch:** A female bends low to the ground with her limbs pulled in. Another animal may then mount dorso-ventrally.
- Lie prone:** An animal lies flat on the ground face downward during a sexual encounter.
- Lie supine:** An animal lies flat on the ground face upward during a sexual encounter.
- Dorso-ventral mount:** An animal mounts another from behind.
- Ventro-ventral mount:** An animal mounts another from the front. (Both animals face each other.)
- Ventro-ventral mount of infant:** An adult animal stands quadrupedally over a supine infant and thrusts without making contact.
- Awkward mount:** An animal mounts another, but orientation is improper, e.g., mounts from side, etc.
- Mount and thrust:** An animal mounts another and thrusts, but intromission does not occur.
- Copulation:** An animal mounts another and intromission occurs (hard to determine whether ejaculation occurs).
- Coo vocalization:** Pursed lips vocalization given by female which may occur before, during or after copulation.
- Reach and touch:** During copulation, a female reaches around with one arm and touches male on the head.

Social play:

Social play: Repetitive, exaggerated, disjointed, and seemingly non-purposeful behavior involving two or more animals. May have both gentle and aggressive components. The list is almost infinite but includes the following:

Climb or stand on another, turn circles around another, piggy back ride, peek-a-boo, mouth, tickle, foot dangle (an animal dangles foot in front of another), tap on another, dangle (an animal holds an infant by its hands and allows it to dangle in the air), arm shake, run-away (one animal runs away from another as an invitation to chase), chase or play tag, swagger walk, chest beat, beat or slap other body part, ground or water slap, object wave, shake, or brush on ground (usually a branch), object throw/hit, object tug/grab, swat, push or nudge, grab/pull, kick, wrestle, bite, play-face (relaxed, open-mouth expression with teeth exposed).

Social other/maternal:

Approach: An animal draws closer to another; because of context and relaxed body posture, motivation presumed to be friendly.

Follow: An animal walks behind another; because of context and relaxed body posture, motivation presumed to be friendly.

Muzzle-muzzle: An animal places its face directly in front of another (within 6 inches).

Groom/inspect: Using the hands or mouth, an animal grooms or examines another's body parts, excluding the anogenital region except when feces being removed.

Active contact: Friendly contact behaviors which occur outside of play context. Includes the following:

Touch (excluding the genitals), grasp, sniff (an animal sniffs another's body parts, excluding anogenital region unless feces are obviously being sniffed), mouth, kiss (an animal puckers its lips against head or face of another), pat or caress, hug or embrace, hold, huddle (animals sit in groups of two or more with bodies in close contact).

Passive contact: An animal sits, lies, or sometimes walks with body in contact with another. Behavior is not as "intimate" as active contact, e.g., animals may sit with only feet touching.

Inside with: Two or more animals, excluding infants being carried, are inside cave or planter together and are not visible to the observer; assume association to be affiliative, although specific behaviors not visible.

Food offer: An animal offers food, browse, or regurgitate to another.

Special social behaviors observed in mothers or caretakers:

- Rock:** A mother supports her infant in arms or on lap and rocks it back and forth.
- Jiggle-bounce:** A mother supports her infant in lap or on legs and bounces and jiggles the infant.
- Dangle-groom:** A mother dangles her infant by one ankle and grooms the anal area.
- Flex-manipulate:** An animal bends and manipulates the infant's body parts.
- Coax:** A mother places her infant on the ground and then walks away and stands or sits at a distance. The mother observes infant intensely, seemingly encouraging it to approach.
- Retrieve:** An animal picks up an infant when infant is alone.
- Restrain:** An animal holds an infant firmly when the infant attempts to leave.
- Shield:** An animal uses its arms or body to shield an infant from another animal or other potential danger.

Special social behaviors observed in infants:

- Climb on or over:** An infant climbs on or over another animal.
- Nose/eye poke:** An infant pokes its finger in another's nose or eye.
- Manipulate mother's nipples:** An infant pulls at or handles mother's nipples (not to be confused with rooting behavior).
- Distress vocalization:** An infant whines or cries when alone; appears to be an attempt to get mother to return.

Agonistic:

- Turn away:** An animal turns away from another in order to avoid, but does not vacate its spot.
- Avoid:** An animal moves away from or gets out of path of another.
- Crouch:** An animal crouches when threatened or attacked by another.
- Hide:** An animal presses itself against a surface so that it is hidden or partially hidden from the view of another.
- Supplant:** One animal approaches another and the latter moves away. The approaching animal then takes that spot.
- Stare:** A fixed, unwavering stare at another with brow furrowed and facial muscles tense.

- Tight-lip face:** A facial expression in which the lips are tightly compressed and the head diverges from side to side.
- Stiff stance:** An animal stands with the legs held rigidly and the body stiff and erect; tight lip face often accompanies.
- Strut-walk:** While in the stiff stance, an animal walks with stiff, short steps.
- Directed chest beat:** An animal chest beats while orienting toward another gorilla in the same exhibit.
- Directed object slap:** An animal orients toward another and slaps ground, rock, wall, inside door, or makes loud splash in the pond.
- Bluff charge:** An animal runs on the diagonal past another but does not make contact.
- Rush charge:** An animal rushes up to and stops just short of another.
- Charge with chest beat:** While charging, an animal beats its chest.
- Charge w/object display:** While charging, an animal waves or throws an object or slaps ground with an object (usually browse).
- Charge and hit:** While charging, an animal hits another with an object (usually browse).
- Leg kick:** An animal kicks its leg in the air at the end of a charge, chest beat or object display.
- Object grab:** An animal snatches an object or browse away from another.
- Object drop or throw:** An animal drops an object down on another from above, or throws an object at another.
- Hit with object:** An animal hits another with an object.
- Hit/slap:** With hands.
- Push**
- Grab/pull**
- Chase**
- Open-mouth threat:** A tense, open-mouth expression with lips raised and pulled back so that canines are exposed; muscles and the forehead are taut and drawn back.

Agonistic -- Vocalizations:

- Soft pant-hoot:** A quiet vocalization in which an animal makes rapid exhalations through "o" shaped lips. The abdomen may be seen heaving up and down.

Scream

Pig grunts: Short, rough, guttural grunts.

Growl: A deep, guttural noise similar to a dog's growl.

Bark: A deep, gruff noise similar to a dog's bark.

Roar: A loud explosive outburst given by a male silverback.

Herd/herded:

Herd: A silverback male controls the movement of a group by following at a close distance (formerly called pursue; may be an attempt to keep females together and in sight.)

Herded: Refers to a group being herded by a silverback male. Animals appear to be avoiding the male as they move away whenever he approaches.

Visual attention:

Observe: An animal watches another gorilla in the same exhibit.

To outside gorillas: [The following behaviors are directed to gorillas in 1) an adjacent exhibit, 2) in night quarters, or to 3) "missing" gorillas (gorillas which have recently been sent out).]

Observe: An animal watches another gorilla in an adjacent exhibit.

Display: Includes behaviors such as chest beating, object throwing, waving, etc., which are directed toward gorillas in an adjacent exhibit.

Bang door: An animal bangs on the inside door when there are group members kept inside night quarters.

Search: An animal travels about exhibit or goes in and out of cave seemingly looking for a missing group member.

Hoot series vocalization: Low pitched "hoo hoo hoos" which can build up to more plaintive sounding, higher-pitched "hoos." Vocalization often terminated by banging on door and has been heard only when group members are missing.

Stereotyped behavior:

Head toss: An animal repeatedly tosses its head in circular fashion; sometimes followed by regurgitation and reingestion.

Arm fling: While sitting, an animal repeatedly flings its arm out for no obvious reason.

Hair pluck: An animal plucks hair from its own body, usually the facial region.

Self-flagellation: While sitting, an animal flogs itself with browse.

Regurgitation and reingestion: [Refers to behaviors in which food is brought up from the stomach to the mouth and then eaten. Gorillas tend to use idiosyncratic methods.]

- Reg. into cupped hand: An animal regurgitates into hand and then eats out of hand.
- Reg. onto substrate: An animal bends over, regurgitates onto ground and then ingests directly from ground.
- Bent-arm regurgitate: An animal lifts and bends arm at elbow while regurgitating in a jerky fashion into cupped hand.
- Suck-regurgitate: An animal brings lips into extreme sucking position and brings regurgitate up into mouth.
- Backward neck stretch regurgitate: An animal leans head backward with neck stretched taut, then regurgitates with mouth closed.
- Regurgitate into mouth: An animal makes "o" shape with lips and brings regurgitate up into mouth.
- Head jerk regurgitate: An animal jerks head in circular fashion while bringing up regurgitate.
- Bend over regurgitate: While sitting, an animal bends over with mouth close to the ground and regurgitates into mouth.

Self-play and object explore:

- Self-play: Includes all solitary play behaviors which are not directed to other animals or to the zoo patrons, including:

Rock body, roll on ground or grass, somersault, turn circles, thigh slap/pat, chest pat (very mild chest beating), lip flap (using fingers), clap hands, manipulate body parts (exaggerated body or head rubbing, pulling on toes, etc.), water play (wading, splashing, etc.), object play (waving branches, tossing leaving in air, playing with tubs, burlaps sacks, etc.).

- Object explore and manipulate: Refers to all behaviors in which an animal uses its hands to investigate or handle objects, excluding those which are preparatory to feeding, including:

Browse manipulate, browse or object wear (an animal drapes browse, burlap sack, etc., over back, shoulders, head), other vegetation inspect/manipulate (rubbing grass on body, throwing grass clumps in air, etc.), manipulate feces or regurgitate (not associated with ingestion), poke at dirt/dig holes, rub self with dirt, mouth objects (including biting, sucking, licking, chewing, or manipulating with tongue), manipulate miscellaneous objects (such as drain covers), items thrown in by patrons, etc.), observe objects (visual examination of an object which is being held or which is within reach), sniff objects, and carry objects (in mouth, hand, or on small of back).

Food getting and ingestion:

Ingest: Includes the following: eat browse, eat grass, weeds, leaves, bark, flowers, or other vegetation, eat miscellaneous food items (including food thrown in by keepers and patrons), spit food out, drink, eat food out of another animal's mouth (seen in infants).

Forage: Behaviors which are preparatory to feeding. Includes the following: gathering, carrying, or dragging browse, bark stripping, gathering and eating seeds, picking and/or carrying grass, weeds, leaves, bark, flowers, or other vegetation or food items.

Audience interaction:

Audience interaction: Includes all behaviors in which an animal interacts with humans (keepers, patrons, etc.), or vehicles drawn in front of an exhibit. Includes: approach/observe, extend arm (animal stretches arm outward toward audience, probably begging for food), point at, clap hands, arm shake, blow kisses, self-play behaviors (which are obviously directed to audience), chest pats, splash water, object throw (including feces, dirt clods, rocks, etc.), threaten audience (animal directs agonistic behavior toward humans, including growl, roar, open-mouth threat, bluff charge, chest beat).

Carry/cling or ride:

Ventral carry/cling: While standing or moving quadrupedally an animal carries an infant who clings to the ventrum.

Dorsal or lateral carry/cling: While standing or moving quadrupedally an animal carries an infant on the back, side, neck, shoulders or head.

Leg drag: An infant grasps another's ankle and clings while the latter animal walks about.

Extended arm carry: An animal carries an infant in palm of outstretched hand and walks tripedally (the "football carry").

Tripedal walk: An animal holds infant against the ventrum and walks tripedally.

Locomotion: *[Includes all forms of movement and travel occurring outside of a friendly/social or agonistic context. Also excludes self play and occasions when an animal is carrying an infant.]*

Walk quadrupedally: An animal walks on four legs.

Walk tripedally: An animal walks on three legs.

Walk bipedally: An animal walks on two legs.

Stand quadrupedally

Stand bipedally

Climb

Scoot

Slide

Roll

Jump

Hang by arms

Swing by arms

Run: (in non-agonistic context).

Change stance: Go from sitting to standing position, etc.

Special locomotor behaviors observed in infants:

Arm/leg flail: An infant jerks its arms and/or legs about in a seemingly random fashion.

Root: An infant gropes and moves head about mother's ventrum in search of mother's nipple.

Crawl: An infant drags its prone body along the ground.

Toddle: An infant walks quadrupedally with short, uncertain steps.

Rest and body maintenance:

Rest: Periods of quiet repose in which any of the following behaviors may occur:

Sit/lie without performing other behaviors, sleep, yawn, stretch, cough, comfort movements (slight position shifts or rolling over while resting).

Self-exploration and body maintenance:

Includes the following behaviors:

Groom/self-inspect (an animal picks at or examines its toes, hands, or any other body parts), oral explore (an animal mouths or licks its body parts), scratch, nose-pick, sniff self, rub eyes, pick teeth, rub self, poke anus/remove feces.

Urinate/defecate

Vomit: (when not part of R/R).

Look out/look about: An animal sits or lies quietly but appears to be observing environment, although specific object of focus is not apparent (same as "stationary alert").

Special rest behaviors seen in infants:

Nurse: An infant suckles at its mother's breast (it is often hard for an observer to tell whether an infant is nursing or sleeping, so we are including "nurse" under rest behaviors).

Other: [These include behaviors which do not readily fall into any category or whose functions are unclear.]

Non-directed agonistic: Includes agonistic behaviors such as chest beat, growl, object slap, etc., which do not appear directed toward other gorillas or to audience, and which occur outside of play context.

Interspecific agonism: An animal directs agonistic behavior toward animals other than gorillas or humans (e.g., swiping at insects, chasing peacocks, etc.).

Visual explore environment: Includes the following: visual attention toward objects in environment which are not within reach (such as planes, helicopters, etc.), and observe animals other than gorillas or humans (such as peacocks, insects, etc.).

Eat feces

Drink urine

Eat another's regurgitate

Monitor/search: An animal looks about exhibit as if to locate the whereabouts of other group members.

Armpit sniff/touch/manipulate: An animal sniffs or touches own armpit, or manipulates area under armpit.

Nipple rub: An animal repeatedly rubs its own nipple.

Self-directed lactating behaviors: Behaviors shown by lactating mothers including:

Manipulate nipples, squirt milk from nipples, and bend over to drink milk from own nipples.

Escape/escape attempt: An animal attempts or succeeds in climbing out of exhibit. May stand on back of another gorilla to reach handhold.

Nest-build: An animal manipulates browse around itself to form a crude, circular nest.

Not visible: An animal is not visible to the observer excluding cases of inside with.

Elliott, R. C. (1976). Observations on a small group of mountain gorillas (*Gorilla gorilla beringei*). Folia Primatologica, 25, 12-24.

Purpose: To summarize the characteristics of range and behaviour in a small gorilla group.

Sampling methods: Modified time sampling technique to record inter-individual distance data. Position mapped at 10 min intervals. Longhand field notes apparently taken on behavior, but no info on how or definitions.

Ethogram key words: Activity budgets/General behaviors, Field study, *Gorilla g. beringei*.

Behaviors:

Agonistic behavior
Allogrooming
Social play
Vocalizations

Fischer, R. B. (1984). Observations of group introductions in lowland gorillas. Behavioural Processes, 9, 293-296.

Purpose: To investigate agonistic responses during and just after group formation.

Sampling: Two hours of continuous observation followed each introduction.

Ethogram key words: Display/Agonistic behavior, Introductions/Socialization.

Behaviors:

Nonagonistic behaviors:

Proximity: When two or more animals were less than 4 m apart for at least one minute.

Arm-over: Lateral extension of arm towards another. Arm was typically relaxed. Aggression has not been observed following approach preceded by arm-over.

Agonistic behaviors:

Contact aggression: Frequencies of hitting, biting or grappling observed between individuals.

Noncontact aggression: Instances of directed pursuit (subsuming charging and chasing), demonstration (species typical postural and facial displays, chest beating, throwing, or aggressively striking an object as part of a sequence of activities), and lunging. Behaviors not clearly directed toward a specific individual were omitted.

Fossey, D. (1972). Vocalizations of the mountain gorilla (*Gorilla gorilla beringei*). Animal Behaviour, 20:36-53.

Purpose: To describe the vocalizations of the mountain gorilla.

Ethogram key words: Vocalizations, Field study, *Gorilla g. beringei*.

Behaviors: (See also: Fossey, D. (1983). *Gorillas in the mist*. Boston: Houghton Mifflin.)

Roar: Monosyllabic loud outburst of low-pitched harsh sound, lasting from .20 to .65 seconds, beginning and ending abruptly. Individual differences in frequency concentrations. Heard only from silverbacks in situations of stress or threat, and primarily directed at human beings, although occasionally at buffalo herds. Always followed, on the part of the emitter, with varying degrees of display, ranging from bluff charges to small forward lunges.

Alarm calls:

Scream: Shrill and prolonged emission of extremely loud sound, lasting up to 2.13 seconds and repeated as often as 10 times. Individual differences not denoted. Screams heard from all age and sex classes, but most frequently from silverbacks. Vocalization heard most often during intragroup disputes, though could be directed toward human beings or ravens if alarm rather than threat was motivation for call.

Wraagh: Explosive monosyllabic loud vocal outburst not as deep as a roar nor as shrill as a scream. Began and ended abruptly and lasted between .2 and .8 second. Individual differences in sound, which were more harmonically structured than roars. Heard from all adults but most frequently from silverbacks. Usually precipitated by sudden situations of stress--the unexpected arrival of an observer, etc. Most effective in scattering group members and never accompanied by aggressive display behavior.

Question bark: Characteristic composition of three notes with the first and third lower than the middle, as if asking the question "Who are you?" Sound was short, lasting between .2 and .3 second, heard more from silverbacks. Usually in situations of mild alarm or curiosity and was common response to discovery of obscured observer, etc.

Cries: Resembling wails of human infants, could build up into shrieks much like human beings' temper tantrums. Emitted between .03 and .05 seconds apart, and could last for nearly 19 seconds. Wails had four distinct frequency concentrations, but shrieks were much less structured. Cries were heard only from infants or young juveniles, frequently when left alone. Cries built up into temper tantrums if stressful situation was prolonged.

Coordination Vocalizations:

- Pig-grunts:** Series of short, rough, guttural noises, pig-grunts are usually delivered between .15 and .4 seconds apart in sequences of nine or ten outbursts. Resembling grunting of pigs feeding, tended to become louder and more closely spaced if prolonged. Most frequently heard during traveling, when trail disputes and altercations over limited food resources were more apt to occur. Pig-grunts were effective rebuttal vocalizations and disciplinary enforcements between adults and young.
- Belch vocalizations:** Deep, prolonged rumbles (*naoom, naoom, naoom*) rather like throat-clearing utterances. The belch vocalization is one of the most complex because of multiple intergradations and functional variations. Variations heard from all sex and age classes. For expressing contentment and verifying position; a slightly shortened belch vocalization was often used when mildly disciplining gorilla young or observers.
- Chuckles:** Raspy expirations of noise verge in intensity depending on degree of play involved. Irregularly spaced spurts of sound varying from .02 to .1 seconds with low frequency concentration. No individual differences.

Intergroup vocalizations:

- Hootseries preceding chestbeats:** Given with or without a terminating chestbeat, consists of prolonged distinct *hoo-hoo-hoos*. Low-pitched, often undetectable to human ear at beginning, but usually built up into plaintive-sounding and longer hoots toward the end. The lengthier the series, the more fluctuations in harmony and phasing. Frequencies ranged between 1.4 and 1.8 kilocycles per second for as many as eighty-four hoots per second. Silverbacks were most frequent emitters. Depending on distance between groups, would or would not terminate vocalizations with displays.

Fossey, D. (1979). Development of the mountain gorilla (*Gorilla g. beringei*): The first thirty-six months. In D. A. Hamburg and E. R. McCown (Eds.), Great apes of Africa (pp. 139-186). Menlo Park, CA: Benjamin-Cummings.

Purpose: To begin describing quantitatively individual differences of mother-infant relations; also describes behavior during pregnancy.

Sampling method: Ad lib field notes, later classified under specific subject headings. Data were then grouped according to two month units of infant age (e.g., 1-2 months old). This paper also describes physical development in detail.

Ethogram key words: Development, Pregnancy, Behavior during, Field study, *Gorilla g. beringei*.

Behaviors: (3 main categories: maintenance activities, maternal interactions, and social awareness, listed according to time unit.) (See also: Fossey, D. (1983). *Gorillas in the mist*. Boston: Houghton Mifflin.)

Newborn (first 24 hrs):

Whines:	Weak, puppy-type.
Grasping reflex	
Rooting	
Nuzzling of nipple	
Sleep	
Ventral carry	
Grooming by mother	
Nurse	

1-2 months:

Ventral clinging	
Ventral carry	
Low abdominal ride	
Thigh ride	
Dorsal ride	
Rooting	
Nuzzling of nipple	
Mouthing or chewing of vegetation debris	
Sleep	
Whines	
Wails:	Loud, high pitched.
Exploring own body	
Rolling over	
Creeping	
Look around	
Grooming by mother	
Nurse	

2-4 months:

Ventral clinging

Ventral carry

Dorsal ride

Crawl

Sitting attempts

Kick, whack, push

Exploratory play,
surrounding
vegetation:Gross, jerky extensions with fingers widely spread before
object is contacted, usually only grasp object.Exploratory play,
mother's body:

Unbalanced crawling, sliding, patting, and hair pulling.

Discipline:

Mock-biting, pushing back at infant.

Eating vegetation debris

Grooming by mother

Distress face

Play face

Whines

Wails

Screeches

Panting play chuckles

Nurse

4-6 months:

Ventral carry

Ventral cling

Dorsal ride

Grooming by mother

Nurse

Exploratory play,
surrounding
vegetation:

Includes manipulation of vegetation.

Exploratory play,
mother's body:

More strenuous, includes mock-wrestling with extremities.

Solo play:

Patting, clapping and whacking own body.

Restrain infant

Eating vegetation:

No food prep, just plucking leaves or gnawing.

Quadrupedal walking

Whines

Wails

Panting chuckles

Screeches

Screams

Sits

Stand bipedally

Social contact w/others

Chest beat

6-12 months:

Ventral ride	
Dorsal ride	
Rump-clinging:	Infant follows mother with one or both hands clasping hair on rump.
Nursing	
Solo play:	Now includes tree climbing.
Leave mother	
Infant restrain	
Contact with mother	
Within arm's reach	
Within 15 feet	
Social play	
Eating vegetation:	No food prep, just plucking leaves or gnawing.
Genital touching:	Mother uses genital touching as training method by which infant is urged to crawl, climb, walk, and run (observed only in captives).
Walk bipedally	
Travel quadrupedally	
Stand bipedally	
Sit	
Nurse	
Push from nipple	

12-24 months:

Dorsal ride	
Ventral carry	
Travel quadrupedally	
Rump-clinging	
Nurse	
Push from nipple	
Social play:	More vigorous.
Solo play:	Swinging, twirling and semi-brachiating in trees.
Eating vegetation:	Now includes stripping leaves.
Grooming mother	
Chest-patting	
Foliage-whacking	
Strut-walking	
Compressed-lip	
Whines	
Wails	
Panting chuckles	
Screeches	
Hoot cries	
Shrieks	
Temper tantrum	
screams	
Howls	
Pig-grunts	
Leave mother	
Mother restrain	
Contact with mother	
Within arm's reach	
Within 15 feet	

24-36 months:

Dorsal ride
 Travel quadrupedal: Includes canter gait.
 Ventral carry
 Nursing
 Push from nipple
 Solo play: Tree play increases, becomes more inventive and daring.
 Social play: Begins including more tree play.
 Eating vegetation: Includes preparation: wadding, stripping, peeling.
 Grooming: Includes siblings, peers, and silverback.
 Whines
 Wails
 Panting chuckles
 Screeches
 Hoot cries
 Shrieks
 Temper tantrum
 screams
 Howls
 Pig-grunts
 Belch vocalization: Basic disyllabic variant of.
 Mount
 Leave mother
 Mother restrain
 Contact with mother
 Within arm's reach
 Within 15 feet

Behavior during pregnancy:

Proximity
 Groom infants
 Staring at infants
 Contact with mother/infant
 Distant travel
 Feeding
 Mount
 Copulation
 Irritability

Fossey, D. (1982). Reproduction among free-living mountain gorillas.
American Journal of Primatology Supplement, 1:97-104.

Purpose: To summarize status of and reproduction in free-living gorillas.

Sampling method: Ad lib field notes.

Ethogram key words: Sexual behavior, Field study, *Gorilla g. beringei*.

Behaviors:

Copulation: Nearly all solicited by females, most commonly dorsoventral. Male sat upright or leaned forward bipedally and held female around waist. Female squatted on lap or bent forward on flexed elbows with rump accessible. Brief adjustment occurred first. Held position from 5 to 20 minutes. Accompanied by vocalizations, primarily by male. Female often had compressed lips; male pursed-lips.

Copulation vocalization: Panting and soft hoots.

Solicitation by female: Sometimes included extending hands fleetingly to touch male's body before retreating; often included glance over shoulder.

Glance over shoulder: To male during solicitation: "come hither look."

Sexual play

Pseudosexual mounting

Interference w/copulation

Genital touching

Frisch, D. J. Columbus Zoo, Gorilla Birth Watch Protocol.

- Purpose:** To recognize changes in behavior of pregnant female, to record onset of labor.
- Sampling method:** Every 15 minutes, note activity of pregnant female. If unusual behavior occurs between interval, write in time and explain.
- Ethogram key words:** Birthwatch.
- Behaviors:**
- Lie:** Being recumbent with little or no weight being borne on hands or feet.
- Sit:** Bearing most weight on buttocks.
- Stand still:** Bearing weight on feet quadrupedally, or bipedally with hands holding on to mesh, glass, trees, etc.
- Locomote:** Walking, running, or climbing.
- ?** Activity can't be scored.
- Rest near:** Sitting or lying within arm's reach of another for at least 10 seconds. Initiator is second animal to rest. The receiver must be relatively immobile but need not be resting.
- Grooming:** Directed touching, licking, or intense visual inspection of another's (GO) or own (GS) skin or pelage. Scratching excluded.
- Intimidation display:** Beating on chest or abdomen, beating on cage surface, rapid exaggerated throwing or shoving of objects. Score when any two or more of these behaviors occur simultaneously or sequentially. Score initiator only.
- Rough up:** Slapping, poking, elbowing, punching, hair pulling, pushing, shoving, or wrestling when not in play or sexual context.
- Aggressive bite:** Biting when not in play.
- Crouch:** Initiator lowers ventrum toward or to substrate, or curls fetally on substrate. Event terminated when normal or resting posture resumed.
- Inspect genitalia:** Sniffing, touching, or intense visual inspection of another's genitalia (IGO) or own genitalia (IGS).
- Sex solicit:** Female purses lips and stares at/follows/reaches toward male. Event terminated when lips relax for at least 10 seconds.

- Copulation:** Dorso-ventral mounting (DVC) or ventro-ventro mounting (VVC) with pelvic thrusting. Event terminated when either animal breaks body contact. Note if intromission confirmed (very difficult) or if semen observed afterward on penis or vagina.
- Masturbate:** Rhythmic rubbing of genitalia with any part of own body (e.g., finger or toe) or against inanimate object.
- Yawn:** Per usual definition. Score each yawn.
- Feces:** Manipulation or mouthing of own or another's feces. Note "eat" if fecal material actually ingested.
- Regurgitate:** Vomiting into mouth, hand, or onto substrate. Note if reingested.
- Play behavior:** Poking, tickling, wrestling, chasing in nonaggressive manner.

Goerke, B., Fleming, L., & Creel, M. (1987). Behavioral changes of a juvenile gorilla after a transfer to a more naturalistic environment. Zoo Biology, 6, 283-295.

Purpose: Investigation of one male juvenile lowland gorilla before and after transfer to new environment, particularly play and stress-related behaviors.

Sampling: 10 minute periods from 10 am to 4 pm daily. Two indices: play index: number of minutes during which some play occurred in each 10 minute observation period. Frequency: is the number of occurrences in each period of 19 selected play activities, divided into social or solitary play.

Ethogram key words: Post-occupancy evaluation, Environment change, Influence of, Abnormal/Stereotypic behavior.

Behaviors:

19 play activities:

Gentle wrestling:	Hugging and rolling.
Rough wrestling:	Standing up, more aggressive behavior.
Chasing	
Running alone	
Playing with water	
Slapping	
Chest pounding	
Clapping	
Playing with branches	
Swinging	
Jumping	
Tumbling	
Spinning	
Throwing	
Manipulating objects	
Moving of the body	
Solitary sexual play	

Social sexual play

Climbing

Grass play

Dirt play

Tree play

Stress-related behaviors:

Coprophagy

Regurgitation/reingestion

Self-clasping

Gold, K. (a) Noise disturbance study, San Francisco Zoological Gardens
(currently affiliated with Zoo Atlanta).

- Purpose:** To study effects of construction noise on gorilla behavior.
- Ethogram key words:** Activity budgets/General behaviors, Noise disturbance, Effects of.
- Locations:** Trees, rocks, quadrants 1-7, gorilla world, out of sight.
- Behaviors:**
- Environmental exploration: Investigation such as touching, sniffing, close visual inspection of parts of the exhibit, habitat, or cage other than gorillas, loose objects, or toys. Does not include aimless oral or manual activities.
- Eat: Chewing/ingestion of food/browse.
- Self directed behavior: Self groom, self clasp, self suck, scratching, rubbing, etc.
- Display behavior: Behaviors used by an animal to draw attention to oneself, oftentimes communicating a specific behavioral state in the displayer. Includes:
- Chest beating
 - Ground or wall slapping
 - Drumming
 - Throwing objects
 - Foot stomping
 - Kicking
 - Clapping
 - Branch whipping
 - Strut walking
 - Pursed-lip tense face
 - Other
- Vocalization: Scream, grunt, bark, etc.
- Solitary behavior: Active physical motions such as in play but without a partner, including rolling, sliding, swinging, spinning, etc.
- Contact: The focal animal is in direct physical contact with another group member.
- Social play: The focal animal is engaging in play behavior with another group member (non-aggressive) such as chasing, wrestling, mouthing, etc.
- Aggression: Chase, hit, grab in aggressive manner (different than social play).
- Sexual behavior: Oral-genital contact, genital-genital contact, digital-genital contact, masturbation.

- Locomotion:** Continuous horizontal or vertical movement of at least 1 body length during the interval.
- Rest:** In an inactive state for a minimum of 10 seconds.
- Miscellaneous behavior:** Digging up enclosure, coprophagy, regurgitation, regurgitation and reingestion.

Gold, K. (b) Gorilla development study. Nationwide, 10/82-10/86.

- Purpose:** To investigate infant development in gorillas.
- Sampling:** One/zero sampling during 15 second intervals.
 Trial=twelve 15 second intervals with a two minute pause (five minutes total). Session=Twelve trials (60 minutes).
 Focal animal sampling.
- Ethogram key words:** Development.
- Behaviors:**
- Approach:*** Focal animal moves toward another (or another toward focal) to within proximity.
- Withdraw:*** One animal retreats from another in a non-passive fashion. Must be the result of an approach.
- Leave by other:**** An animal leaves proximity of another, but not as an result of an approach.
- Touch:*** Physical contact with non-focal animal other than in categories below.
- Lift/hold:**** Weight support contact.
- Carry:**** Infant is transported by another animal.
- Ventro-ventral contact:**** Infant's ventrum in contact with other's.
- Dorso-ventral contact:**** Infant's ventrum in contact with other's back, shoulders, or back of neck.
- Proximate:**** Within arm's reach of another (arm length of larger animal).
- Near:**** Out of arm's reach of another, but within fifteen feet.
- Social play:*** Physical play with a partner including "rough and tumble" play such as tickling, wrestling, chasing. Score TOUCH in addition if it occurs.
- Genital inspect*:** Close observation, touching, sniffing or manipulation of genital area of self or other.
- Sexual behavior*:** Mounting, pelvic thrusting, mock copulation, with a partner or inanimate object.
- Nipple contact:**** Infant's mouth on nipple, with or without actual suckling visible.
- Environmental exploration:** Investigation such as touching, sniffing, close visual inspection of parts of exhibit, habitat or cage other than gorillas or loose objects, toys. Does not include aimless oral or manual activities.

Object contact:	Contact with toys or any loose object.
Mouthing:	Using tongue, lips, teeth to explore environment, objects or animals. May include biting, chewing, food or non-food. May be during a play bout.
Solitary play:	Active physical motions such as in play, but without a partner. Includes rolling, sliding, swinging, spinning, etc.
Self-directed behavior:	Self clasp, self groom, self suck, scratching, rubbing, etc.
Play face:	Open mouthed, slack lipped "smile" exposing teeth. May be accompanied by head shake, patting, mouthing or play biting.
Locomotion:	Continuous horizontal or vertical movement of at least one body length during trial.
Rest:	In an inactive state for five seconds or more.
Vocalization:	Belch Cough/grunt Growl Hoot Bark Scream Whine/whinny Pant
Display:	Chest beat Throwing Slapping/tearing Whipping Thumping/Slamming Strut Walk Threat face
Out of sight:	Observer is unable to see focal animal.
Contact with human:	Any contact with a person. Must be initiated by focal animal in order to be scored.

* note initiator/recipient

** note non-focal animal

Gould, J. E. University of West Florida and The Zoo, Gulf Breeze, Florida.

Purpose: Collection of behavior, posture/locomotion, and location data, primarily to document socialization and group formation involving a previously isolated adult male.

Sampling: Focal instantaneous time samples, at one minute intervals when observing two gorillas (male-female dyad) and 30 second intervals when observing one gorilla. These data are supplemented with audiotaped notes, written ad lib notes, and still and video photography.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Display/Agonistic behavior, Introductions/Socialization, Abnormal/Stereotypic behavior, Vocalizations.

Behaviors:

Positional Behaviors:

Posture:

Lie:

Lying down: Specify dorsal, ventral, lateral.

Leaning: Legs under body and body less than 45 degrees from horizontal--specify ventral or lateral and on which arm or arms.

Sit:

Sitting: Resting on buttocks--specify any support or suspension with hands.

Squatting: Knees bent, buttocks above heels--specify any support or suspension with hands.

Standing, quadrupedal
/pronograde

Standing, tripedal

Standing,
bipedal/upright

Crouching: Quad stand with limbs flexed/bent.

Locomotion:

Walk:

Walking, quadrupedal
/pronograde: (knuckles?)

Walking, tripedal

Walking,
bipedal/upright

Run:

Running, quadrupedal
/pronograde

Running, tripedal

Running,
bipedal/upright

Other:

Climbing: Specify up, down, left or right.

Hanging by hand(s)

Swinging by hand(s)

Brachiating: Progressing by swinging from one hold to another by the arms.

Jumping

Spinning

Sliding

Rolling: Sideways.

Somersaulting: Head over heels.

Eating, drinking, and eliminating activity:

Eat:

Eating: Specify type of food.

Gathering: Gathering food in heaps.

Foraging: Wandering in search of food.

Sharing food: With another gorilla.

Symbolically eating

Drink:

Drinking water

Drinking milk

Nursing

Eliminate:

Defecating

Attending to feces

Handling feces

Passing gas

Urinating

Attending to urination

Handling urine

Object-oriented activity (specify if play):

Look (specify object/food):

Glancing: Briefly observing sideways out of corner of eyes.

Looking: Observing directly.

Watching/staring: Prolonged and attentive observing; curiosity?

Manipulate (specify object/food and body part used):

Smelling

Mouthing

Reaching

Touching

Fiddling

Grasping/grabbing

Clasping/hugging/
cuddling/embracing: In arms.

Releasing

Patting

Swiping

Slapping

Hitting

Kicking

Barging

Pushing

Pulling

Throwing

Swishing/splashing: Water.

Holding: Specify hands, feet, mouth, back, etc.

Carrying: Specify hands, feet, mouth, back, etc.

Other:

Approaching

Moving away

Retreating: Withdrawing from apparent danger (e.g., snake).

Avoiding/evading

Fleeing/escaping

Grimacing: e.g., at water spray.

Swatting insects

Killing insects

Catching insects

Nest building

Tool using: Specify tool and object acted on.

Tool manufacturing: Specify tool and method.

Self-oriented activity (specify if play):

Manipulate:

Non-genital self-manipulating:

Autogrooming: Picking through own hair with fingers and/or lips.

Rubbing

Scratching

Picking: Specify nose, eye, etc.

Finger tapping

Hand clapping

Chin slapping: See chest-beating sequence below.

Hair pulling: Stereotypic/abnormal?

Genital self-manipulating:

Masturbating

Bottom bouncing: By female.

Self-inspecting: Visually.

Finger licking: May be associated with menstruation.

Finger smelling: May be associated with estrus.

Stereotypic/Abnormal activity (may not be abnormal unless behavior is stereotypic; could include preceding behaviors listed under "manipulate"):

Rocking

Swaying: Side to side.

Shuffling

Pacing

Self-biting

Self-grasping

Turning back

Sitting in corner: As though in bed.

Jawing: Opening and closing mouth.

Grinding teeth

Regurgitating and
reingesting

Coprophagy: Eating dung.

Drinking urine

Other:

Sleeping: Eyes closed, no movement for 3 minutes.

Resting: Specify if eyes are closed--see sleeping.

Yawning

- Looking: At self; specify body part if possible.
- Self recognition: In mirror or other reflector.
- Sitting or standing
in water
- Running through water
- Splashing in water
- Chest-beating sequence: Release of accumulated tension associated with excitement as in sexual excitement, play, mild irritation, impatience, frustration, lonesomeness, novelty, or when in conflict between aggression and flight; this is the apparent primary function and cause; for additional functions as well as descriptions and components to be specified--see below under "inter-individual oriented activity" both "interact" and "aggress-defend."

Inter-individual oriented activity (specify if play):

Look:

- Glancing: Briefly observing sideways out of corner of eyes.
- Looking: Observing directly.
- Watching: Prolonged and attentive observing.
- Staring: Listed below under "reproductive" and "aggressive acts".

Interact (*nonagonistic behavior, includes play; note that several of these behaviors also occur in agonistic interactions--see below under "aggress-defend"*):

Non-contact:

- In vicinity: 1-5 meters.
- In proximity: Within arm's length; approximately 1 meter.
- Approaching: Moving towards.
- Displacing: Taking place of another.
- Lunging: Incipient charge: abrupt advance of 0-3 steps.
- Charging: Running is lateral, not forward, if there is conflict between charge and retreat.
- Chasing: Pursuing rapidly.
- Throwing material: Specify material.

Standing off:	Rigid/strut quad stance, facing each other; often associated with tight-lipped face--see below under "other," can be sexual initiation by female toward male or vice versa.
Moving away	
Retreating:	Withdrawing from what is dangerous or disagreeable.
Avoiding/evading	
Fleeing/escaping	
Chest-beating sequence:	See above.
Reaching/inviting:	Arm extended, hand open, palm up; initiates play; see also under "reproductive".
Arm-over response:	Palm down.
Smelling	
Imitating	
Teasing	
Playface/pleasure face:	Relaxed, open mouthed.
Play biting	
Play walking	
Play running	
Play chasing	
Play fleeing	
Bouncy gait	
Contact:	
Touching:	Non-genital.
Hand holding	
Grasping/grabbing	
Clasping/hugging/cuddling/embracing:	In arms.
Releasing	
Giving	
Taking	

Leaning on

Grooming: Picking through hair of another with fingers and/or lips.

Tagging

Patting

Swiping

Slapping

Hitting

Kicking

Pummelling

Barging

Pushing

Pulling

Wrestling/grappling

Mouthing: Taking an arm or shoulder between teeth and appearing to bite, but applying no pressure; can be intimidation by dominant male and thus agonistic.

Reproductive:

Charging parallel: By male, sometimes preceded by chest-beating display, usually followed by standing off.

Standing off: See above under "non-contact".

Staring: Can be sexual initiation by female toward male, often associated with standing off and head shaking, may be tight-lipped.

Head shaking: See below under "aggress-defend: submissive displays".

Inviting: Extended arm with hand open and palm up by female while staring at male; another variation is drumming on hindquarter or ground by female while staring at male.

Offering/presenting: Prone position: female crouches, backs up toward male to display her genitalia, and looks back at him; supine position: female lays on back and makes rhythmic pelvic movements, also often inviting as above.

Inspecting genitalia

Manipulating gen.

Oral-genital contact

Mounting: Specify dorso-ventral or ventro-ventral.

Pelvic thrusting

Paternal/maternal
caring: e.g., nursing.

Disciplining

Aggress-Defend (*agonistic behavior, aggressive or defensive interaction--see also behaviors listed above under "interact"*):

Aggressive acts:

Non-contact:

Staring: Furrowed brow?

Staring openmouthed
/threat face: Specify if teeth showing.

Staring bared-
teeth scream face/
threat face

Head jerking or
snapping: Toward antagonist; specify if audible snap of jaws.

Forward lunging: Incipient charge: abrupt advance of 0-3 steps.

Bluff charging: If conflict between charge and retreat; then lateral running.

Throwing non-fecal
material

Throwing feces

Physical contact:

Hitting
Barging
Grappling
Biting
Etc.: See "interact: contact" behaviors above.

Threat Displays (Domination):

Chest-beating
sequence: Intimidation to repel intruders; for functions other than aggress-defend, see above under "interact" and "self-oriented activity". Consists of rhythmic beating, with alternating cupped hands, of the chest, but also abdomen and thighs, as well as cheek drumming with mouth open, chin drumming with backs of fingers, and rhythmic beating of ground, floor, logs, etc.; chest-beating is only one of 9 actions which do not necessarily all occur

together, or in the following order; full sequence exhibited only by silverbacked males and infrequent--specify components present:

Hooting
 Symbolically feeding
 Rising bipedally
 Throwing vegetation
 Chest-beating
 Leg kicking
 Running sideways bipedally then quadrupedally
 Slapping and tearing vegetation
 Ground thumping (or beating/slapping other inanimate object, e.g., wall)

Strut standing: Very stiff quad posture, elbows bent outward, shoulders hunched, sometimes head diverted to side, brief sideways glances at opponent; commonly with tight-lipped/lip-in/tense-mouth face; may occur at end of chest-beating display.

Strut walking: As above, with short-stepped quadrupedal walking.

Strut running: May be followed by striking a barrier or another animal with shoulder or forearm.

Submissive displays (Submission):

Turning head away: Also used to indicate aggression is not intended.

Head shaking: Also used to appease when unsure and during sexual initiation by female while staring at male; relatively rare; specify if lower jaw relaxed.

Cowering: Crouching on abdomen; head lowered, arms and legs tucked under; protects body.

Other:

Pursed-mouth/pout/
 light-distress face: Watch out, I'm ready to get mad; or male during copulation.

Tight-lipped/lip-in/
 tense-mouth face: Usually with periodic quarter turns of head and sideways glancing; situations of uncertainty, tension, courtship; or female during copulation.

Grimacing

Fear grinning

Vocalizing: Specify, see vocalizations below.

Piloerecting: Erecting body hair, especially on back and head.

Marking: e.g., by urinating.

Observer-oriented activity (specify if play):

Look:

- Glancing: Briefly observing sideways out of corners of eyes.
- Looking: Observing directly.
- Watching/staring: Prolonged and attentive observing; curiosity?

Interact (*non-agonistic behavior, includes play; see "inter-individual oriented activity" above for additional behaviors and descriptions*):

Listening

Pursed-mouth/pout/
light-distress face

Tight-lipped/lip-in/
tense-mouth face

Chest-beating sequence

Vocalizing: Specify, see "vocalizations" below.

Exchanging/giving

Imitating

Signing: Specify: e.g., chest tap, head tap, hand clap.

Aggress-Defend (*see "inter-individual oriented activity" above for listing of specific behaviors*):

Aggressive Acts

Threat displays
(Dominance)

Submissive displays
(Submission)

Vocalizations:

Aggressive Calls:

Roar/threat bark: Simple, mono-syllabic, sudden loud outburst of low-pitched harsh sound. Strong aggression of silverback male to predator (including human) or other group. Always followed by some type of aggressive behavior.

Growl: Deep guttural prolonged noise resembling growl of dog and not loud. Mild aggression in stationary group associated with "annoyance."

- Pant series:** Rapid sequence of forced expulsions of air, of very low frequency, seems whispered, resembles pig grunt (see below). Mild threat within group.
- Mild alarm calls:**
- Question bark:** Three notes, low-high-low, as in "who are you?" Very mild alarm or curiosity.
- Hiccup bark:** Resembling di-syllabic spurt of noise like a hiccup. Very mild alarm of curiosity.
- Fear and Alarm Calls:**
- Silence:** Sudden cessation of all sound emission, vocal and mechanical. Most extreme form of fear, e.g., to sounds of approaching poachers.
- Screams:** Shrill and prolonged emission of extremely loud sound. Aggressive disputes within group; copulating female.
- Wraagh/alarm bark:** Explosive, monosyllabic outburst of loud sound, abrupt beginning and end. Sudden alarming situation; loud noise; very close or sudden contact; not accompanied by aggression.
- Distress calls:**
- Cries:** Wails, sobs, screeches and hooting types of distress calls; can build to screams or shrieks (temper tantrums). Infant separated or in difficulty.
- Whines:** Very soft, prolonged plaintive sound, like that of puppy. Danger of injury or abandonment; not limited to infants.
- Group coordination vocalizations:**
- Pig grunts:** Short, rough, guttural grunts (av. 9-10), resembling grunting of pigs feeding at a sty. Mild aggression in moving group, e.g., right of way dispute during feeding; silverback when pursuing female before copulation or when guiding group movements; disciplinary enforcement.
- Hoot bark:** Like bark of dog but more "who-who" than "woof-woof" or "wah-wah" sound; like hiccup and question barks but two, not one or three syllables. Alerting to mild alarm; group movement initiation.
- Belch vocalization:** Deep, prolonged rumble, like soft belch; most commonly long, di-syllabic throat-clearing (ummm-ummm) sound, with second note lower than first; at times more complex, like croons, purrs, hums, moans, wails, or howls. Feeding; group contentment; localization; useful in allaying gorilla apprehension among human observers.

Intergroup communication:

Hoot series: Given with or without a terminating chest-beat or other elements of that sequence. Prolonged series (av. 10-15) of "hoo hoo hoos", low-pitched, quiet at start of series, building up. Intergroup encounters with aggressive component; intergroup communication/vocal probing/social space echolocation.

Miscellaneous vocalization:

Chuckles: Raspy expirations verging between pants and grunts. Social play, tickling.

Copulatory pants: Rapid series of soft, short duration hoots, becoming more prolonged and merging into long howl-like note. Silverback copulating. Also dove-coos by both sexes.

Whinnies: Resembles raspy neighing of horse. May be anomalous; ailing animal.

Harcourt, A. H. (1979a). Social relationships among adult female mountain gorillas. Animal Behaviour, 27:251-264.

- Purpose:** To examine relationships among adult female mountain gorillas.
- Sampling:** Ad lib sampling, using behavioral checksheet, including initiator/recipient, bout lengths.
- Ethogram key words:** Social behavior, Field study, *Gorilla g. beringei*.
- Behaviors:** (Also see Harcourt, A. H. (1977). *Social relationships of wild mountain gorilla. Ph.D. thesis, University of Cambridge.*)
- Proximity:** Within 2m or 5m of partner.
- Touching:** More than 5 sec.
- Body contact:** Excludes grooming.
- Grooming:** More than 5 sec.
- Agonism:**
- Avoid:** Actions ranging from simply leaning away from an approaching animal to cringing under an attack or getting up and leaving.
- Pig-grunts:** Antagonistic, coughing-type vocalization.
- Chest beating**
- Strut runs**

Harcourt, A. H. (1979b). Social relationships among adult male and female mountain gorillas in the wild. Animal Behaviour, 27:325-342.

- Purpose:** To examine relationships among adult male and female mountain gorillas.
- Sampling:** Continuous ad lib sampling, using behavioral checksheet, including initiator/recipient, bout lengths; plus activity and location scans at 15 minute intervals.
- Ethogram key words:** Social behavior, Field study, *Gorilla g. beringei*.
- Behaviors:** (Also see Harcourt, A. H. (1977). *Social relationships of wild mountain gorilla. Ph.D. thesis, University of Cambridge.*)
- Proximity:** 2m and 5m.
- Grooming:** Only those lasting > 5 sec.
- Agonism:**
- Approach-retreat:** Non-aggressive approach followed by retreat.
- Approach**
- Retreat**
- Avoid:** Movement away within 1 to 2 sec following the other's approach, but not to beyond 2 m
- Supplanted:** Movement away within 1 to 2 sec following the other's approach, to beyond 2 m.
- Threat display:** Includes chest-beating, ground-thumping, foliage-slapping, strutting and running.
- Hooting**
- Attacks:** Hits, kicks, and bites.
- Pig grunt:** Sharp grunt.

Harcourt, A. H. & Stewart, K. J. (1981). Gorilla male relationships: Can differences during immaturity lead to contrasting reproductive tactics in adulthood? Animal Behaviour, 29:206-210.

Purpose: To examine relationships among adolescent males and group leaders and tendency to remain in natal group.

Sampling: Ad lib sampling, using behavioral checksheet, including initiator/recipient, bout lengths.

Ethogram key words: Social behavior, Field study, *Gorilla g. beringei*.

Behaviors: (Also see Harcourt, A. H. (1977). *Social relationships of wild mountain gorilla. Ph.D. thesis, University of Cambridge.*)
(Also see Stewart, K. J. (1981). *Social development of wild mountain gorillas. Ph.D. diss., University of Cambridge.*)

Proximity
Contact
Grooming

Hoff, M. P., Nadler, R. D., & Maple, T. L. (1981a). Development of infant independence in a captive group of lowland gorillas. Developmental Psychobiology, 14, 251-265.

- Purpose:** To supplement the data available on infant development of gorillas.
- Sampling:** One/zero sampling, one minute intervals in 1st 3 and last 5 months; focal animal continuous sequential activity record for remainder of the 18 month study using 30 minute samples.
- Ethogram key words:** Development.
- Behaviors:**
- Ventro-ventral:** Animals' ventral surfaces in contact.
- Dorso-ventral:** One animal's ventrum pressed against another animal's dorsum. Herein used exclusively in "back ride" position (infant lying on mother's back).
- Ventral-dorso:** As above. Herein used exclusively as infant's dorsum against its mother's ventrum.
- Other contact:** Any form of contact excluding ventro-ventral, dorso-ventral and ventro-dorsal.
- Proximate:** Animals not in contact, but within 3 ft (1 m) (arm's length) of one another.
- Distant:** Animals between 3 and 15 ft (1 and 5 m) apart.
- Far distant:** Animals beyond 15 feet (5 m) apart.
- Leave:** Moving from a position of contact to proximate, distant or far distant.
- Return:** Reestablishing contact with another animal. Scored for the animal reestablishing contact, regardless of which animal left.
- Social approach:** Animal moving from distant or far distant to proximate (contact not established).
- Follow:** Moving behind and in the same direction as another animal.
- Restrain:** Prevent another animal from moving away.
- Struggle:** Animal attempting to leave another while being restrained.
- Retrieval:** Move another animal into closer spatial proximity as defined by the above contact variables.
- Nipple contact:** Animal's mouth placed on another's nipple with or without suckling.

- Wean: Remove an infant from the nipple.
- Remove: Move another animal into a position of less close spatial proximity as defined by the above contact variables.
- Social examination: Inspect another animal with fingers, feet, and/or mouth (includes stare).
- Object examination: Inspection and/or manipulation of articles in the environment (does not include solitary play using objects).
- Protect: Saving an animal from possible harm (by retrieval, crouching over the animal, holding arm up, etc.).

Hoff, M. P., Nadler, R. D., & Maple, T. L. (1981b). Development of infant play in a captive group of lowland gorillas (*Gorilla gorilla gorilla*). American Journal of Primatology, 1, 65-72.

- Purpose:** To supplement the data available on infant play, and particularly of development of infant play in gorillas.
- Sampling:** One/zero sampling, one minute intervals in 1st 3 and last 5 months; focal animal continuous sequential activity record for remainder of the 18 month study using 30 minute samples.
- Ethogram key words:** Development.
- Behaviors:**
- Infant solitary play: Initially consisted of ground slapping...at 7th month consisted of gymnastic play.
- Mother-infant play: Typically involved gently nudging with finger, arm, or leg by the mother, and wrestling with and mouthing of the mother by the infant. Play was often exhibited in a discontinuous, reciprocal fashion.
- Infant-infant play:
- Active social play: "Rough and tumble" play. Typically consisted of chasing, lunging, tackling, vigorous wrestling, falling on the other, and vigorous mock biting.
- Moderate social play: Typically involved lying on the play partner, light bouncing on the partner's stomach, or mild pulling.

Lockard, J. S. Ethogram for longitudinal study of Seattle's Woodland Park gorillas. University of Washington.

- Purpose:** To develop a longitudinal database on captive gorillas.
- Sampling:** 15 minute continuous focal-animal samples, divided into 30, 30-second intervals, of all behaviors; with location scans at 5 minute intervals.
- Ethogram key words:** Activity budgets/General behaviors, Social behavior, Sexual behavior, Development, Maternal behavior, Display/Agonistic behavior, Vocalizations.
- Behaviors:** *(Only an abbreviated ethogram is presented here. A manuscript describing the full ethogram, and detailing the data collection process, is presented in Appendix 1.)*
- NonSocial Behaviors:**
- Locomotive Behaviors:*
- Quadrupedal:
- Stand: On all four extremities.
- Walk: Forward progression or backward motion.
- Lateral walk: Forward progression with sideways deviation (species characteristic).
- Run: (Conventional definition.)
- Tripedal stand/walk/run: On three extremities.
- Bipedal stand/walk/run: On two lower extremities.
- Sit: Buttocks in contact with ground or supported by heels with the back vertical.
- Handstand: (Conventional definition.)
- Lie: Reclines on substrate.
- Circle: Spin, roll, somersault in self play (conventional definitions).
- Climb: Movement up/over an object.
- Jump: Vertical spring from substrate.
- Fall: Tumbles abruptly from one position to another.
- Hang: Suspended by one or both arms from elevated surface.

Scoot: Swings legs between hand placement while in a sitting posture.

Slide under: Squeezes beneath object in reclined position.

Self-directed Behaviors (while stationary):

Urinate/defecate: (Conventional definitions.)

Collect/discard stool: Manually gathers feces eats/or drops.

Cradle foot: While reclined, holds lower extremity in arm.

Self maintenance: Manual grooming of face and body.

Rest: Reclined with eyes closed.

Pat: Hit self with hand.

Regurgitate: Manually collects vomit, eats/or discards.

Shake: Repeatedly moves hand/or head in self play.

Adult self nurse: Mouths own nipple.

Food and/Environment Directed Behaviors:

Consume: Eat/drink.

Forage: Search for, uproot, tear off and/or pick up edible items.

Chase birds: Rapidly following fleeing individual(s).

Pull/rock object: Manipulates object.

Pry: Attempts to open door/window with hand or object.

Thread: Attempts to manually insert object through opening.

Drape: Covers body part with bough or object (e.g., burlap).

Nest build: Arranges objects (straw, branches, burlap) in rim around and/or under body.

Hold object(s): Supports objects in mouth or extremity(ies).

Lick/sniff: Tongue touch or smells object.

Shred object: Tears apart or peels object with hands or mouth.

Rub: Touches object with back and forth motion.

Drop object(s): Releases object from mouth or extremity(ies).

Tool dig: Uses object to disturb substrate.

Lift/sift: Manually scoops soil and discards.

Brush substrate: Smooth and/or clear area with hand.
 Look at/up: Eyes fixed on (environmental) object.

Noncontact Social Behaviors:

Facial displays:

Yawn: Tips head back, exposing mouth cavity fully or partially while inhaling.
 Attention: Active, direct or over-the-shoulder observation of conspecifics/humans in area.
 Relaxed face: Eyes neutral and mouth closed, surveys environment and visible other(s) without obvious attention.
 Estrus gaze: Hard, fixed gaze by female conspecific toward male conspecific.
 Stare face: Head tipped slightly downward, eyes hard and fixed. Lips pursed or curled back, may scream or roar.
 Uneasy face: Refrains from direct stare at other. May have mouth tightly compressed and or head turned to side.
 Pout face: Lower lip pursed and protruding slightly. Pulled down lip corners and hollow cheeks may be seen.
 Fear grimace: Head tilted slightly back, eyes darting back and forth. Lips curled back at mouth corners, exposing gums and teeth.
 Sneer: Upper lip drawn back.
 Head shake: Moves head back and forth.
 Play/laughter face: Mouth open and corners rounded. Exposed teeth and gums, and laughing motions without vocalizations may be seen.

Vocalizations:

Roar: Sudden, loud outburst of low-pitch sounds from open mouth.
 Growl: Deep, guttural prolonged sound.
 Pant: Repeated, rapid exhalations.
 Bark: Dog-like sound.
 Scream: Shrill, loud, prolonged sound.
 Wraagh: Abrupt, monosyllabic explosion of loud sound.
 Pig grunt: Series of short, rough guttural pig-like sounds.

Belch:	Soft, deep prolonged rumble.
Hoot:	Series of distinct hoo-hoo sounds.
Chuckle:	Series of raspy, successive expirations.
Sexual grunt:	By male when copulation is averted/terminated before fruition.
Raspberries:	Lips extended, rapid exhalation.
Staccato grunt:	Similar to pig grunt. Grunts emitted on inhalation as well as exhalation.
Hoot-whine:	High volume hoot with level dropping considerably to a narrow band of prolonged sound.
<i>Postural displays:</i>	
Strut displays:	Stiff quadrupedal stance, arms bent outward at elbow (species characteristic). Frontal oblique, or parallel variants.
Strut display w/motion:	As defined above, while walking alone or in parallel with other.
Running display:	Bipedal or tripedal run with outswept arm (hand holding object or empty).
Reach for:	Extends extremity in direction of other.
Throw:	Manually tosses object.
Catch:	While stationary, grabs thrown object.
Arm swing:	Sweeps arm out towards other.
Chest/body pound:	Rapidly beats body with open, slightly cupped hands.
Kick at:	Rapidly extends hindlimb out and back in direction of other.
Hit surface:	Strikes substrate/structure with hand or object.
Social forage:	Coordinated foraging with other(s).
Social sniff:	Explores body part, excreta or secretion of other.
Wave:	Flaps hand or arm in air.
Hand clap:	Brings palms together rapidly.
Head jerk:	Moves head quickly in direction of other.
Lunge:	Rapid, short quadrupedal jump toward other.
Self protect:	At approach of other, cowers, flinches or blocks body with arm.

Approaches:	Runs or walks to stationary other.
Leaves:	Runs or walks from stationary other.
Chases:	Behind other, both running.
Conflict intervention:	Supports one of two (or more) disputing others.
Leads/follows:	In front of other, both walking.
Supplant:	Concedes location to approaching other.
Proximity:	Other in nearby location (within 30-60 cm).

Contact Social Behaviors:

Agonistic/play interactions:

Strike:	Use of extremity in brief, sharp contact with other; e.g., hit, poke, kick.
Grab:	Manually seize other suddenly.
Wrestle:	Grabs and hits other. May roll on ground, each individual grappling, mouthing and slapping other.
Mockbite:	Teeth in contact with other without penetration.
Bite:	Seizes other with teeth.
Push/pull:	Shoves away/draws other closer with extremity.
Steal:	Grabs object from possession of other.
Body press:	Uses chest to restrain crouched other.

Sexual interactions:

Present:	Remains stationary with ano-genital area towards other.
Probe:	Explores genital area of other with hand or mouth.
Probe avert:	Activity that foils successful probe; sitting, distraction, cowering, threatening, or exiting.
Mount:	Assumes position for copulation dorsal-ventral, ventral-ventral, or variation. Male may use hind limb in restraint of female.
Mount avert:	Activity that foils successful mount; sitting, distraction, cowering, threatening, or exiting.
Copulation:	(Conventional definition) with multiple thrusts; may see ejaculatory pause.

Adult/young interactions:

Nurse:	Suckles nipple(s) of female.
Nurse prevent:	Activity that prevents young from nursing; blocking nipple, nipping at, and/or pushing away.
Hold infant:	Support young against body with arm(s) while stationary.
Hold/carry solicit:	Young holds arms above head in proximity to older other.
Carry infant:	Supports young against body with hand/arm while moving; variants (e.g., dorsal carry, leg carry).
Pick up:	Manually lifts young.
Release:	Relinquishes hold on young.
Shift:	Moves young to another position on body.
Retrieve:	Pulls young back.
Shake:	Abrupt manual movement of young.
Kidnap:	Grabs young from other.
Infant cling:	Young self-supported by holding onto other.
Drag infant:	Manually pull infant while moving along substrate.
Swing:	Rhythmically moves suspended young by arms.

Other contact affiliative interactions:

Allogroom:	Uses mouth/or hand to inspect/pick pelage of other.
Social lick:	Mouth to body part, excreta or secretion of other.
Caress:	Gently rubs mouth or hand over body part of other.
Repose together:	Sit or recline in contact with other.
Tickle:	(Conventional definition.)
Kiss:	Mouth briefly touches facial area of other.
Hug:	Embraces other with arm.
Social climb:	Ascends/or descends other.
Fall off:	Loses hold on other.
Jump on/off:	Abrupt ascent/descent of other.
Solicit:	Begs food or object from other.
Offer:	Extend food or object to other.

Mannchen, K. (1980). A method of analysis of the activity patterns of lowland gorillas (*Gorilla gorilla gorilla*) at the Miami Metro Zoo. Animal Keepers' Forum, 465-471.

Purpose: To determine if there were differences in behavior of 5 lowland gorillas.

Sampling: One/zero Hansen's checklist, 15 minute samples, 100 samples per gorilla.

Ethogram key words: Activity budgets/General behaviors.

Behaviors:

Activities:

- On ground
- Climbing
- Elevated
- Walking
- Running
- Sitting
- Standing on all fours
- Kneeling on elbows
- Standing bipedally
- Lying down
- Yawning
- Sleeping
- Manipulating with hands
- Manipulating with mouth
- Wearing something on head
- Drinking
- Urinating
- Eating
- Bowel movement
- Nesting
- Grooming self

Social interactions:

- Grooming another
- Contact passive
- Contact active
- Playing
- Transport
- Nursing

Sexual responses:

- Masturbation
- Presenting
- Copulation
- Ejaculation
- Initiating sexual encounter

Emotionally aggressive and submissive behaviors:

Thigh beating
Chest beating
Charging display
Tight lips
Strutting walk
Beating on objects
Throwing objects
Grinding teeth
Smashes object
Pucker hooting
Grumble
Staring
Chasing
Hitting
Grappling
Mock biting
Biting
Screaming
Coalitions
Turning of head
Head shaking
Cowering
Dominant supplanting
Subordinate supplanted

Abnormal behaviors:

Stereotyped rocking
Coprophagy
Regurgitation reingestion
Pacing

Maple, T. L. & Hoff, M. General Gorilla Ethogram.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Development, Maternal behavior, Display/Agonistic behavior.

Behaviors:*Contact variables:*

Ventro-ventral: Common usage.

Dorso-ventral: M dorsal, I ventral (i.e., back-ride position).

Ventro-dorsal: Vice-versa above.

Other contact: Any contact other than above or "touch".

Proximate: Out of contact, within arm's (Mother's) length of other.

Distant: Farther than one arm's length from the other, less than 15 feet.

Far distant: Beyond 15 feet from other animal.

Hold: Animal clinging to another.

Touch: Momentary contact with hand (this behavior is scored independently of other contact variables).

Maternal behaviors:

Back ride: Infant riding on her mother's back, "jockey style."

Hanging walk: Animals VV, mother walking quadrupedally.

Tripedal walk: Mother holding infant with one arm while walking.

Crutch walk: Infant in mother's lap, M move using arms as crutches.

Protect: Save from possible harm; by retrieve, crouching over infant, holding arm up, etc.

Retrieve: Move another animal into closer contact.

Restrain: Prevent another from moving away.

Wean: Remove infant from nipple.

Punish: Mother preventing infant from moving into closer position with her (includes pushing animal into the ground).

Extended arm carry: Mother carrying infant away from her body and off the ground.

Extended arm drag: Mother carrying infant away from her body but along the ground.

Infant behavior:

Whimper

Scream

Nipple contact: Infant's mouth on mother's nipple.

Struggle: Infant attempts to leave while mother restrains.

Arm out: Infant holding arm out to mother (i.e., when mother moves away).

Crawl: Animal moving on hands and knees.

Individual behaviors:

Active play

Solitary play

Auto groom: Pick through own hair with fingers and/or lips.

Self manipulation: As manipulate but self-directed.

Eat

Defecate

Urinate

Postural/movement:

Lie

Sit

Squat

Quadrupedal stand

Quadrupedal walk

Bipedal stand

Bipedal walk

Bipedal walk w/support: Walking bipedally while holding some supporting substrate.

Climb

Leave: Move from other.

Social approach: Move from Distant to Proximate.

Return:	Move back into contact within 15 seconds of leaving.
Follow:	Moving after another animal.
Chase:	Following another animal at a run (usually in play).
Displace:	Take another's place.
Retreat:	Move away from another as it approaches and follows.
Turn away:	Turn bodily away from another as it approaches.
Walk by:	One animal walks by another, becoming proximate or in contact only for a moment.
Crawl:	Animal moving on hands and knees.
Stand with support:	Animal standing bipedally while holding some supporting substrate.
Perch:	Animal off the ground and not moving (i.e., lie on climbing apparatus).

Run

Gallop

Arm-in-arm: Hip hold. Animals walking tripodally holding each other around the body shoulder (arms entwined).

Play behaviors:

Initiate social play:	Animal responsible for beginning social play bout.
Passive social play:	Less than whole body involvement, often gentle rocking, mouthing, or wrestling.
Active social play:	Whole body involvement, including rough wrestling, rolling, chasing.
Play hit:	Animal standing or sitting and repeatedly hitting another (usually during active social play).
Side-by-side play:	Parallel play - animals proximate and both engaged as in active social play.
Play movement:	Attempted play imitation (non-reciprocated).
Play face:	Grin (teeth together, lips pulled back over teeth).

Aggressive displays:

Cough:	Vocal threat, usually in series of three or more.
Quadrupedal stiff stance:	Animal standing, stiff manner, with elbows turned inward (in tension situation).

Stiff walk:	As above, but walking quadrupedally.
Head divert:	Head turned away from object being threatened.
Tight lip:	Lips compressed together.
Lunge:	Animal rushing at another in short, fast run (without hit).
Lunge with hit:	As above, including a hit with hand or foot.
Chest beat:	Slapping chest alternatively with hands.
Wall beat:	As above, but directed toward inanimate object in the environment (i.e., wall, pole).
Ground slap:	Thumping the ground with one or both hands.
Vegetation:	Plucking a piece of vegetation and placing it between the lips (without chewing).
Hand clap	
Throw vegetation:	Tossing vegetation and/or rock at beginning of lunge sequence.
Openmouth bared teeth:	Lips pulled back over teeth, mouth open.

Sexual behaviors:

Mount:	Assume sexual position.
Thrust:	Rhythmic pelvic movements against another animal.
Penile erection	
Genital examination:	Animal manipulating another's pelvic region with fingers and/or mouth.
Present:	Animal turning its hindquarters toward another.

Other behaviors:

Manipulate:	That is, rub, rock, pat, scratch, turn, rock, bounce, etc., behavior directed toward another.
Groom:	Picking through another's hair with fingers or lips.
Object examination:	Examining objects in the environment in any way except stare.
Social examination:	Examining another with fingers, feet, mouth, includes stare.
Confiscate food:	Take food from another.
Confiscate object:	Take object from another.

Confiscate infant: Animal gaining control of infant from another (original animal may still be in contact with infant).

Mouth: Excludes biting.

Stereotypy: Repetitive motions or vocalizations, or abnormal maintenance of a posture, for which there is no obvious biological significance.

Meder, A. (1985). Integration of hand-reared gorilla infants in a group.
Zoo Biology, 4, 1-12.

- Purpose:** To document the introduction and integration processes of hand-reared gorilla infants into a group.
- Sampling:** Period I: ad lib sampling
 Period II: focal animal sampling for 5 hours per 4 weeks.
 Distances sampled at 5 minute intervals. Contacts were noted.
- Ethogram key words:** Development, Introductions/Socialization.
- Behaviors:** *(following Meder's dissertation, 1982)*
- Stand facing:** Stand in front of partner quadrupedally and look at him directly for several seconds.
- Display:** Specific behavior including stiff stance, piloerection and tense lips, mostly combined with further elements mentioned in Schaller (1963) and Meder (1982).
- Smell:** Bring the nose very close to partner's body for at least one second.
- Genital investigation:** Touch ano-genital region of partner with finger or lips or smell it.
- Touch with hand:** Extend one hand toward partner and touch him briefly.
- Touch with body:** Sideswipe partner while moving past him.
- Run toward:** Run in the direction of partner from a distance.
- Run after:** Follow partner for several meters while running.
- Hit:** Slap partner with one hand once.
- Beat:** Slap partner with both hands alternately.
- Push:** Press one hand against partner briefly.
- Tear:** Grasp partner and pull him briefly into oneself's direction.
- Play:** Nonaggressive interaction with more than 3 s of body contact and both partners participating actively with such patterns as hit, push, tear, hold, bump against partner, play-face (mouth open widely, teeth not visible).
- Back-ride:** Rest on the back of partner, who is either standing quadrupedally or walking or climbing, for several seconds.

Meder, A. (1986). Physical and activity changes associated with pregnancy in captive lowland gorillas (*Gorilla gorilla gorilla*). American Journal of Primatology, 11, 111-116.

- Purpose:** To quantitatively determine changes in social behavior and locomotor activity in 5 lowland gorillas.
- Sampling methods:** **Frankfurt:** Whole group observed ad lib, as well as focal animal sampling.
- Stuttgart:** Focal animal sampling, nine 5 minute samples per female, per observation block.
- Ethogram key words:** Activity budgets/General behaviors, Social behavior, Pregnancy, Behavior during.
- Behaviors:** (*following Meder's dissertation, 1982*)
- Long social play:** Nonaggressive interaction with at least 10 seconds of body contact and with both partners participating actively. Behavior patterns included hitting, pushing, tearing, holding, and bumping against the partner. The play face (mouth open widely, teeth generally not visible) was exhibited frequently.
- Threat:** Noncontact aggression consisting of a display directed toward the partner: staring at him or following him while showing the display posture (stiff stance, piloerection, tense lips).
- Social contact:** Behaviors directed toward a group member by the focal animal. This included all forms of physical contact as well as threat. A new contact was noted when at least three seconds had elapsed since the last contact to the same partner had been broken.
- Locomotion:** A move of the focal animal from one place to another with at least three steps. A new locomotion was noted when the female had rested in one place for at least ten seconds.

Meder, A. (1990). Sex differences in the behaviour of immature captive lowland gorillas. Primates, 31, 51-63.

Purpose: To investigate behavioural development of immature gorillas and differences in terms of sex and different rearing conditions.

Sampling methods: Scan sampling (1 minute intervals) was used for all solitary and some social behaviors. All social behaviors were observed with continuous focal animal sampling. One observation block consisted of 10 hours of scan sampling distributed over the day and 5 hr of focal animal sampling in the afternoon within one week.

Ethogram key words: Activity budgets/General behaviors, Development.

Behaviors: (not defined) (*following Meder's dissertation, 1982*)

115 behavior patterns were included, including:

Behavior of subject toward objects
 Behavior toward own body
 Behavior toward conspecifics
 Behavior toward visitors
 Locomotion
 Body movements
 Vocalizations
 Location
 Asleep
 Nest building
 Allogrooming
 Self-grooming
 Aggressive behavior: Biting, slapping, pushing, pulling.
 Social contact
 Play

Mitchell, R. W. (1989). Functions and social consequences of infant-adult male interaction in a captive group of lowland gorillas (*Gorilla gorilla gorilla*). Zoo Biology, 8, 125-137.

Purpose: To investigate the behaviors of captive male lowland gorillas to infant, of the infant to the males, and of the infant's mother to the behavior of the males and infant.

Sampling: Ad lib.

Ethogram key words: Development, Paternal behavior.

Behaviors:

Simple actions: The majority of simple actions described have been "used in other studies as undefined elements in definitions of higher order action patterns, or were presented without definition, so do not require definition here" - see Estrada, 1984, Tilford & Nadler, 1978.

Combinations of simple actions:

Dragging: When an animal grabbed an infant in contact with its mother and ran while holding onto the infant, thereby pulling both the infant and its mother behind it.

Collecting: When an animal pulled or pushed, toward itself, an infant.

Kidnapping: When an animal moved away with an infant when the kidnapper was not the primary caregiver.

Caressing: When an animal gently moved its hand around the head of another animal.

Cuddling: When an animal embraced another whereby at least one of the animals involved had his or her arms around the other.

Episodes: A sequence of social actions that occurs when one organism performs temporally close social actions toward another organism.

Nadler, R. D., Collins, D. C., Miller, C., & Graham, C. E. (1983). Menstrual cycle patterns of hormones and sexual behavior in gorillas. Hormones and Behavior, 17, 1-17.

- Purpose:** To investigate possibility that different aspects of sexual activity might be differentially associated with two hormone peaks.
- Sampling methods:** 30 minute daily tests (midmorning and midafternoon) of sexual behavior initiated on the day after the first day of menses and for each cycle continued to the next period of menses. Tests consisted of introducing female with male.
- Ethogram key words:** Sexual behavior.
- Behaviors:**
- Copulation:** Genital-genital contact, dorso-ventral or ventro-ventral, accompanied by a series of rhythmic pelvic thrusts executed by the male.
- Male solicitations:** Male approaches female, followed by male pulling female toward him, preparatory to covering the female.
- Covering:** Male, standing quadrupedally, assumes position behind and above the female so as to approximate their genitals, with or without grasping the female's sides or hips, generally in the dorso-ventral position.
- Male display:** Charge directed at or parallel to the female, with or without prior chest- or wall-beating and accompanied or not by hitting or kicking the female.
- Male success:** Male solicitation that is followed by female presenting.
- Female presenting:** Quadrupedal stance, ranging from legs extended to crouching, in which female's genitals are directed toward the male.
- Male success index (MSI):** Proportion of days on which male solicitations were successful, multiplied by 100.
- Female solicitation:** Female approaches the male, followed by presenting, but not preceded by male solicitation or male display.
- Female success:** Female solicitation followed by copulation.
- Female success index (FSI):** Same but for females.
- Attractivity, proceptivity, and receptivity:** [Defined as according to Beach (1976)].
- Attractivity:** Frequency of male solicitation days.
- Proceptivity:** Frequency of female solicitation days.
- Receptivity:** MSI.

Nadler, R. D. (1985). Sex-related behavior of immature wild mountain gorillas. Developmental Psychobiology, 19, 125-137.

Purpose: Providing data on sex-related behavior of immature wild mountain gorillas, to supplement Schaller's work.

Sampling methods: Ad lib sampling incidentally to a study of mother-infant relations. All observed sex-related behaviors were recorded, including identity of participants, positions of bodies, # of pelvic thrusts, other repetitive acts of genital stimulation or the duration of such behavior, and group activity at time.

Ethogram key words: Sexual behavior, Field study, *Gorilla g. beringei*.

Behaviors:

Positions: Dorso-ventral or ventral-ventral.

Genital stimulation: Principally when animal executed thrusts against the body of another, included all positions. Episode defined as a single bout or multiple bouts in which bouts occurred within a few minutes of each other.

Thrusting: Rhythmic pelvic movements.

Ogden, J. J., Hoff, M., & Maple, T. L. Zoo Atlanta.

Purpose: To study enclosure utilization and general patterns of adaptation to new enclosures in lowland gorillas.

Sampling method: 15 minute continuous focal samples of all behaviors, with location scans at 15 minute intervals.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Development, Maternal behavior, Display/Agonistic behavior, Abnormal/Stereotypic behavior.

Behaviors:

Solitary behaviors [no actor/recipient]:

Stand: Includes bipedal and quadrupedal (note bipedal in comments if possible). (back legs are both straight).

Locomote: Any moving of the animal's entire body including walking, running [bipedal or quad].

Sit: Includes squat and leaning on one elbow.

Lie: Dorsally, ventrally, or on side (includes lying with one shoulder touching ground, or leaning ventrally on both elbows).

Climb

Autogroom: Pick through own hair with fingers and/or lips.

Masturbation

Solitary play: Self-motion play.

Feed/forage: Manipulating the substrate or food item while intermittently transferring items to the mouth or chewing a food item. Note item eating (i.e., browse, monkey chow, fruit, tree branch). Includes drinking, but note if drinking from stream or lixit.

Object manipulate: The handling of available objects with hands, feet, or mouthing; examining except stare. [Note: score this category if sorting through straw or manipulating branches/browse without movement to mouth]. Note object being manipulated.

Carry/hold: The carrying or holding of object with hands or feet. Either while locomoting or while stationary. (Or carrying on back while walking). Note object.

Social Behaviors - note actor/recipient:

Approach:	Approach another to within one arm's length.
Displace:	Take place of other.
Move away:	Move away from another, either from within contact or within arm's length.
In contact:	In contact with another, any posture. Note posture.
Sexual behavior:	Includes mount, insertion, genital inspection, etc. Note in comment section.
Social play	Motion play; social play involving object manipulation should be noted as SP/OM.
Groom-social:	Pick through hair of other with fingers and/or lips (excludes scratching).

Displays/Threats/Vocalizations: (note actor/recipient where known)

Rumble/belch vocal.	
Cough vocalization:	Vocal threat; usually in series of three or more.
Quad. stiff stance:	Animal standing; stiff manner; with elbows turned inward (in tension situation).
Stiff walk:	As above, but walking quadrupedally.
Tight lip:	Lips compressed together.
Openmouth bared teeth:	Lips pulled back over teeth, mouth open.
Agonism:	Includes biting, fighting, hitting, slapping, lunge with hit; any aggression with contact. Time interval between bouts of 15 seconds.
Lunge:	Animal rushing at another in short, fast run (without hit).
Chest beat:	Slapping chest alternately with hands (includes beating of thighs by females).
Wall beat:	Beat/slap directed toward inanimate object in environment (note object).
Ground slap:	Thumping ground with one or both hands.
Hand clap	
Throw object	Tossing object at beginning of lunge sequence.

Abnormal Behavior (non-social; no actors/recipient):

Self-biting:	Usually of arms, legs, torso, hands.
Self-clasping/ self-grasping:	Embracing, or use of hands or feet to hold onto a part of body.
Stereotyped pacing	
Rocking:	Often associated with self-clasping.
Coprophagia:	Ingestion of fecal material (not necessarily their own).
Regurgitation/ reingestion:	Regurgitation and reingestion of feeding matter.
Out of view	Note substrate if known, tunnel if known.
Other	Any behavior of interest not listed here; explain in comments.

Maternal/infant behavior:

Active social play:	Whole body movement, including rough wrestling, rolling, chasing.
Passive social play:	Less than whole body movement, often gentle rocking, mouthing or wrestling.
Initiate play:	Animal responsible for beginning social play bout.
Retrieve:	Retrieve another while moving away.
Remove:	Move another into a lesser contact (e.g., VV to OC).
Restrain:	Prevent another from moving away.
Wean:	Remove infant from nipple.
Social examination:	Examining another with fingers, feet, mouth; includes stare.
Nipple contact	
Manipulate:	Rub, rock, pat, scratch, turn, rock, bounce, etc.; behavior directed toward other.
Self-manipulation:	As manipulate only self-directed.
Struggle:	Infant attempts to leave while Mother is restraining.

Contact Variables:

Ventro-ventral:	Common usage.
Dorso-ventral:	M dorsal, I ventral; i.e., back ride position.
Ventral-dorso:	As above, but vice-versa.
Other contact:	Any contact other than above or "touch".
Proximate:	Out of contact, within arm's length.
Distant:	Greater than arm's length but less than 15 feet.
Far distant:	Greater than 15 feet from another animal.

Maternal Transport:

Tripedal walk:	Mother holding infant with one arm while walking.
Hanging walk:	Animals VV, mother walking quadrupedally.
Extended arm drag/carry:	Mother carrying infant away from her body and along/or off the ground.
Back ride:	Infant riding on mother's back, "jockey style".
Crutch walk:	Infant in mother's lap, M move using arms as crutches.
Other transport positions	

Quiatt, D., Miller, L., & Cambre, R. (1986). Overt behavior correlates of menstruation and ovulation in a lowland gorilla. In D. M. Taub and F. King (Ed.), Current perspectives in primate biology (pp. 32-41). New York: Van Nostrand Reinhold.

- Purpose:** To investigate whether observations of social behavior might help pinpoint ovulation sufficiently to increase chances of successful artificial insemination.
- Sampling:** Eight weeks of data collection, during each of two summers. Most days 1 hour of observation in the morning and 1 in the afternoon, scheduled when gorillas were most active (during 2 hours following morning feeding and 2 hours preceding afternoon feeding). Frequencies/rates resulted.
- Ethogram key words:** Social behavior, Sexual behavior.
- Behaviors:**
- Displacement:** One individual "causes" another to move away from the location he/she has been occupying. The first may or may not replace the second in space. Cause may be assumed from apparent intent of the displacer (e.g., gaze or eye aversion) or attentiveness of the displaced individual. Rather than infer cause, and to insure consistency, displacement recorded as whole body movement of one individual which was one or more feet away from the other, when the other is in movement and has approached within six feet.
- Proximity:** One individual moves to within arm's reach of another and remains without other interaction for at least 5 seconds. If the approached individual moved off before 5 seconds was up, we scored the behavior as "Displacement." (Note the qualifier, "without other interaction." This is what distinguished "Proximity" as an observational unit.)
- Contact:** Any tactile communication other than "Examination," e.g., touching, brushing, hitting, sitting, lying in contact, etc.
- Groom:** No grooming of either animal occurred, so eliminated this.
- Examination:** An inspection of one animal by another or a self-inspection. Examinations involved looking, touching, smelling, mouthing, and combinations thereof.
- Display:** A stereotypical hammering of the chest with the knuckles. We noted two levels of intensity: (1) a low level, without accompanying locomotion or other signs of agitation - 1 or 2 taps or a series of light taps (the displaying individual might be sitting or lying), and (2) a rapid series of forceful chest-pounding while the displaying individual was standing and perhaps locomoting. Many such displays were directed toward spectators. If a display involved contact with the window, we noted that contact.

Riess, B. F., Ross, S., Lyerly, S. B., & Birch, H. G. (1949). The behavior of two captive specimens of the lowland gorilla *Gorilla gorilla gorilla* (Savage & Wyman). *Zoologica*, 111-118.

Purpose: To provide basic information on lowland gorillas, comparable to that of Carpenter's.

Sampling: During three-minute periods of observation all behaviors which occurred were checked. 30 minute observation periods. Sequences were noted.

Ethogram key words: Activity budgets/General behaviors, Social behavior.

Behaviors:

42 behaviors divided into the following five categories

Posture and locomotion:

Walking, pronograde
 Walking, upright
 Running, pronograde
 Running, upright
 Standing, pronograde
 Standing, upright
 Sitting
 Climbing
 Swinging by hands
 Hanging
 Sliding
 Left-handedness
 Right-handedness
 Lying down
 Sleeping
 Nest building

Eating, drinking and elimination:

Gathering food in heaps
 Sharing food with cage mate
 Drinking water
 Drinking milk
 Regurgitation of milk
 Handling of feces
 Attention to urination

Self-oriented activity:

Self-manipulation (non-genital)
 Manipulation of genitalia
 Manipulation of objects
 Manipulation of food (non-eating)
 Attitude toward stream of water
 Self-grooming

Inter-individual behavior:

Chasing
Wrestling
Grooming
Inspection and manipulation of genitalia
Presenting
Mounting
Pelvic thrusts
Chest thumping
Vocalizing
Dominance

Observer-oriented behavior:

Throwing of feces
Throwing of non-fecal material
Attentional responses
Vocalization

Schaller, G. (1963). *The mountain gorilla: Ecology and behavior*. Chicago: University of Chicago Press.

Purpose: To provide the first systematic examination of behavior of wild mountain gorillas.

Sampling methods: Ad lib field notes.

Ethogram key words: Activity budgets/General behaviors, Sexual behavior, Social behavior, Display/Agonistic behavior, Field study, *Gorilla g. beringei*.

Behaviors: A separate ethogram is not provided, but behavioral descriptions are integrated into the text. The reader is referred to the book.

Schildkraut, D. & Akers, J. Boston MetroParks Zoos.

Purpose: To compile baseline and comparison data on a pair of gorillas before and after their move from Cincinnati Zoo to Stone Zoo.

Sampling methods: All occurrences.

Ethogram key words: Activity budgets/General behaviors, Social behavior.

Behaviors:

Social behaviors:

Play: Wrestling, chasing, running past and cuffing each other, gentle slapping and grabbing, bipedal jostling (time + frequency). Initiator listed first. Note: a play bout must be separated by a 10 second interval or another behavior to constitute another frequency.

Groom: Animal mouths and manipulates the fur of another.

Touch: Animals in contact when not engaged in any other defined activity (time + frequency). Initiator listed first.

Arm's length: Animal is within arm's reach of another and not engaged in any other defined activity (time + frequency). Initiator listed first.

Displace: One animal approaches another, and the 2nd animal moves away before they are within arm's reach (frequency). Initiator listed first.

Fight: Rough hitting or biting accompanied by screaming.

Self Behaviors:

Display: A single incidence of banging/kicking doors and walls OR a series of events which includes chest beating, stamping feet, running and pulling chain, loud clapping. The display is usually performed bipedally and ends in running a short distance (frequency).

Self-groom: One animal mouths and manipulates its own fur for more than 5 seconds (frequency). Note: self-groom does NOT include licking fingers during the process of regurgitation and reingestion.

- Self-play:** Sliding on the floor when wet, turning in circles on all fours, clapping softly and shaking head or limbs, rolling on back and slapping feet with hands, hanging upside down from chain or ladder, squirting self with water spout, grabbing hose from keeper, putting food on head and "laughing", swinging on ladder, somersaults, spitting into hands or on floor, pushing food along the floor, wiggling chain, standing on hands and walking up the wall, sticking out tongue, pushing food out of cage, self-tickling. AW = a behavior typical of the female where she scoots along the floor on her rear end for short distances. The female also puts her knuckles or fingers in her eyes and walks about the cage "as if she were blind" (frequency).
- Regurgitation and reingestion:** Food or fecal material is eaten, regurgitated back into the hands or floor and eaten again (frequency).
- Cage change:** Animal moves from cage I to cage II through doorway (frequency).

Schildkraut, D. (a), Boston MetroParks Zoos.

Purpose: To determine the dominance relationship between an adult male and female pair of gorillas, with particular regard to its possible effect on their breeding behavior.

Sampling methods: Frequency and sequential recording, three ten-minute intervals per day.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior.

Behaviors:

Gigi crosses into Sam's exhibit

Sam sits and calls at Gigi's door

Grooming

Feeding/stealing/
bribing with food

Spatial displacement

Aggressive behavior: Such as hitting, biting, etc.

Threats: Specifically directed at the other gorilla - not at staff or public.

Social encounters

Breeding

Schildkraut, D. (b), Boston MetroParks Zoos.

Purpose: Ethogram for introduction of three peer-raised juvenile gorillas to a mother-infant pair.

Sampling methods: Frequency recording, one hour per day, five days per week, over a twelve month period.

Ethogram key words: Introductions/Socialization, Social behavior, Development, Maternal behavior.

Behaviors:

Self-directed behaviors:

Self-grooming

Sleeping

Sliding

Walking: Specify bipedal or quadrupedal.

Swinging

Spinning

Handstands

Hand clapping

Hand shaking

Eating

Urinating

Defecating

Object manipulation: Specify the object and indicate how object is manipulated, i.e. thrown, banged, put on head, etc.

Stare

R & R: Regurgitation and reingestion of food.

Coprophagy: Eating feces.

Noncontact social behaviors:

Quadrupedal straight leg stance

Open mouth threat

Chest beating

Bluff charges

Vocalizations

Approach: Move toward another animal.

Affiliate: Sits within one arm's length of another.

Displace: One animal moves out of the way as another approaches.

Contact social behaviors:

Wrestling

Tumbling

Charging with hitting

Chasing

Tickling

Hitting

Pushing

Biting

Mounting

Copulating

Grooming others

Sit/touch: Sits or reclines in contact with another animal.

Mother/infant behaviors:

Nursing: Specify which breast (right or left).

Carrying: Specify v-v, v-d, d-v, arm, leg, thigh, etc.

Retrieve: Mother retrieves infant.

Restrain: Mother prevents infant from leaving her.

Struggle: Infant struggles to get away from mother.

Other:

Follow: May be used when any animal follows after another. Often seen in mother/infant pairs.

Cage change: Used when introductions take place to indicate that an animal has moved from one cage to another.

Schildkraut, D. (c), Boston MetroParks Zoos.

<u>Purpose:</u>	Observations on the behavior of an isolated adult male gorilla.
<u>Sampling methods:</u>	Frequency recording, three ten-minute periods per day.
<u>Ethogram key words:</u>	Activity budgets/General behaviors.
<u>Behaviors:</u>	
Staring:	Watching or looking at something.
Groom/body part:	Specify part of body being groomed.
Slide on floor:	Usually occurs when cage floor is wet.
Object manipulation in quiet play:	Playing with objects while in a stationary position.
Object slapping:	Beating or slapping on an object with hands or feet - specify which he uses, and the object.
Bluff charges:	Incomplete charges, specify target (i.e., zoo keeper).
Charges with hitting:	Usually hits the front glass or the side walls. Specify target.
Sitting	
Climbing	
Running	
Sleeping:	Specify on floor or platform.
Eating	
R & R:	Regurgitation and reingestion.
Coprophagy:	Eating feces.
Chest beating	
Facial threat:	Usually open mouth.
Threat vocalization	
Threat stance	

Schildkraut, D. (d), Boston MetroParks Zoos.

Purpose: Observations on the introduction of an adult male/female pair.

Sampling methods: Positions mapped at beginning, after 5 min., and at end of observation period. All occurrences of the following behaviors were recorded, noting actor and recipient.

Ethogram key words: Introductions/Socialization.

Behaviors:

Full body display

Head display: Usually done from a sitting position.

Charge

Charge with slam

Lunge

Rattle/bang door: From a stationary position.

Approach door: Moving toward the door in a non-threatening manner, i.e. not charging.

Sitting at door

Passing objects through door

Physical contact: Touching the other animal.

Withdrawal from door area

Display with chest beating

Schildkraut, D. (e), Boston MetroParks Zoos.

Purpose: Gorilla Enclosure Utilization Checksheet.

Sampling methods: 15 minute continuous focal samples of all behaviors, with scans at 15 minute intervals of locations.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Sexual behavior, Development, Maternal behavior, Display/Agonistic behavior, Abnormal/Stereotypic behavior.

Behaviors:

Same as those listed by Ogden, J. J., Hoff, M. and Maple, T. L. with two additions:

Diarrhea

Ventral/ventral embrace

Smalley, S. L. (1979). Comparative analysis of aggressive and other social behavior of captive lowland gorillas and free living mountain gorillas. California Anthropologist, 9, 1-28.

Purpose: To compare the interactions and behaviors of captive gorillas to those of free living mountain gorillas.

Sampling methods: Interactions were recorded during or immediately after behavioral sequences. Group was observed as a whole, interactions given priority over solitary behaviors.

Ethogram key words: Activity budgets/General behaviors, Social behavior, Display/Agonistic behavior, Field study, *Gorilla g. beringei*.

Behaviors:

Aggression: For purposes of study defined as dominance: one gorilla is considered dominant over another if the first displaces the second, with or without physical contact.

Other behaviors recorded (definitions unclear):

- Feeding
- Chestbeating
- Self-grooming
- Mutual grooming
- Object carrying/holding
- Running
- Rising as part of a display
- Rubbing of underarms
- Copulation
- Sexual presentation

Watts, D. P. (1988). Environmental influences on mountain gorilla time budgets. American Journal of Primatology, 15, 195-211.

- Purpose:** To investigate mountain gorilla time budgets and the effect which characteristics of their food supply and other ecological factors have on them, including sex differences.
- Sampling:** Focal sampling to collect time budget data, durations recorded.
- Ethogram key words:** Activity budgets/General behaviors, Field study, *Gorilla g. beringei*.
- Behaviors:** (See also Watts, D. P. (1983). *Foraging strategy and socioecology of mountain gorillas. Ph.D. Diss., University of Chicago.*)
- Feeding:** Preparation and ingestion of food. Feeding bouts began when a stationary individual, either on arrival at a feeding spot or after having engaged in some other activity there for at least 5 seconds, started to prepare food for ingestion (which included chewing). They ended when the individual ceased preparation and ingestion for at least five seconds or shifted position by at least 1 m.
- Moving:** All locomotor activity other than shifts of position of less than 1 m during feeding and resting and locomotion during play.
- Resting:** Stationary, nonsocial behavior during which animals were not feeding (sleeping, autogrooming, etc.)
- Social:** Social interactions with a measurable duration, including play, allogrooming, sexual behavior, and some forms of agonistic behavior.
- Other:** Other subsistence behavior, including nest building, and, for females, nursing. Because it was usually impossible to be certain whether a female was nursing when she had her back turned, and because "other" activities occupied only a tiny fraction of observation time, they are not discussed below.

Watts, D. P. (1990). Mountain gorilla life histories, reproductive competition and sociosexual behavior and some implications for captive husbandry. Zoo Biology, 9, 185-200.

Purpose: To draw implications from the data on wild mountain gorillas to apply to captive management and husbandry of captive lowland gorillas.

Sampling: All occurrences sampling of below behaviors.

Ethogram key words: Sexual behavior, Field study, *Gorilla g. beringei*.

Behaviors: (See also Watts, D. P. (1983). *Foraging strategy and socioecology of mountain gorillas. Ph.D. Diss., University of Chicago.*)

Sociosexual behavior: Heterosexual mounts with thrusting, with or without intromission.

Copulations: Mounts in which one or both partners thrust and positioning by both suggests that intromission occurred.

Woods, S. Denver Zoo, Enrichment Study.

Purpose: Investigate effects of enrichment protocols and general activities.

Sampling: Focal animal, behavioral checklist.

Ethogram key words: Enrichment, Activity budgets/General behaviors.

Behaviors:*Aggressive interaction - with another gorilla:*

Display threat
Physical attack
Chase
Displacement

Other -- urinate, ambiguous, etc.:

Drink
Sexual activity - mating attempts, solicit
Playful social interaction

No observation:

Not visible
Bad observation (cannot see behavior)

Stereotypic or undesirable behaviors:

Regurgitation/reingestion
Coprophagy
Masturbation

*Self-grooming (must be manual and visual)**Manipulate:*

Manipulate, investigate, play: With objects or exhibit features (takes precedence over public orientation).
Manipulation of enrichment items

Travel:

Quadrupedal walking
Quadrupedal running
Climbing
Eat while traveling
(has priority)

Public orientation:

Intently watching
humans

Display: e.g., chest beating, charging, hitting glass, baring teeth.

Gesturing: e.g., clap, treat sign.

Vocalizing: (can see chest vibrate).

Idle:

Sit or squat

Stand

Recline

Intently watching

another animal: (has priority)

Feed:

Foraging: Searching in or under hay, eating hay, seeds, nuts.

Foraging while intently
watching public

Grass

Eating from enrichment
objects

Eating anything else

Eating while intently
watching public

Browse

Object contact:

Structural features: Walls, doorways, back fence, front glass, platforms.

Furnishings: Trees, shelves, net, ropes, log, rocks, poles.

Enrichment objects

Other portable objects

Outside:

Includes doorway to outside yard.

Up:

On shelves, trees, net.

Wood, G., Forthman, D. L., & Ogden, J. J. Ethogram for enrichment study,
Zoo Atlanta.

Purpose: To study general activity budgets with a focus on those behaviors likely to be affected by presentation of enrichment items.

Sampling method: Group scans at 2 minute intervals, for hour long observation periods.

Ethogram key words: Enrichment, Activity budgets/General behaviors, Social behavior, Display/Agonistic behavior.

Behaviors:

Position and activity:

Lie: Dorsally, ventrally, or side (includes lying with 1 shoulder touching ground, or leaning ventrally on both elbows).

Sit: Includes squat and leaning on one elbow.

Stand: Includes bipedal and quadrupedal (back legs are both straight).

Locomote: Any moving of the animal's entire body including walking, running [bipedal or quad].

Climb: Climbing a substrate.

Hang/swing: Hanging or swinging from a substrate.

Solitary behaviors:

Autogroom: Pick through own hair with fingers and/or lips.

Object manipulate: Manipulating available non-food item with hands, feet, or mouth: e.g., branches, rocks, or bark (if not attempting to eat such items).

Carry/hold: Carrying or holding a non food item with hands, feet, or draped across back. Either while locomoting or stationary.

Solitary play: Self-motion play.

Masturbation: Manipulating genitals.

Social Behaviors - note actor/recipient:

Proximity: Within one arm's length to another group member.

Social contact: In contact with another group member.

Social groom: Pick through another's hair with fingers or lips.

Social play: Includes all motion social play behaviors: chase, somersault, hit, etc.

Sex: Includes mount, insertion, genital inspection, etc.

Displays/Threats:

Quad. stiff stance: Animal standing; stiff manner; with elbows turned inward (in tense situation).

Stiff walk: As above, but walking quadrupedally.

Tight lip: Lips compressed together.

Bared teeth/openmouth: Mouth open with lips pulled back over teeth.

Agonism: Aggression with contact, including: biting, fighting, hitting, slapping, and lunge with hit.

Lunge: Animal rushes at another (without hit).

Chest beat: Slapping chest alternately with hands (includes beating of thighs by females).

Wall beat: Beat/slap wall or other substrate.

Throw object: Throwing an object, frequently exhibited before lunge.

Abnormal Behavior:

Self-biting: Usually of arms, legs, torso, hands.

Self-clasping/
self-grasping: Self-embracing, or holding onto a body part.

Stereotyped pacing: Pacing, walking in circles.

Rocking: Often associated with self-clasping.

Coprophagia: Ingestion of any fecal material.

Regurgitation/
reingestion: Regurgitation and reingestion of feeding matter.

Out of view: Note substrate if known, tunnel if known.

Other: Any other behavior of interest not listed.

Feeding behavior:

Carry/hold food: Carry or holding food or enrichment item. Note item.

Foraging: Gathering and collecting food items. Note item.

Process food: Processing, preparing, stripping, peeling, seek, remove pith, sucking, husking, and chewing. Some processing may take place inside the buccal cavity (e.g., peeling). Note item.

Yamagiwa, J. (1986). Activity rhythm and the ranging of a solitary male mountain gorilla (*Gorilla gorilla beringei*). Primates, 27, 273-282.

Purpose: Description of activities, ranging behavior and responses to neighboring groups by a lone male gorilla.

Sampling
(of behavioral info): Focal sampling, each activity was scored in every 10 minutes by 10 second observations.

Ethogram key words: Activity budgets/General behaviors, Field study, *Gorilla g. beringei*.

Behaviors:

Feeding

No move

Locomotion

Others:

Chest-beating display?

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¹ Studies not designated as field studies were conducted in captivity.