



Documentación y evaluación de programas de entrenamiento

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Objetivo:

mostrarles como implementar un sistema de registro y evaluación para sus programas de entrenamiento

¿Qué es la conducta? y su importancia

Etogramas

- ¿Qué son?
- ¿Que deben contener?
- Importancia
- ¿Cómo hacer un etograma?
- Recursos bibliograficos

Programa de entrenamiento

- Planeación
- Registro
 - Tipos de registro conductual
 - El uso de apps
- Evaluación
 - Ejemplo del método de evaluación en Zacango

¿Qué es la conducta?

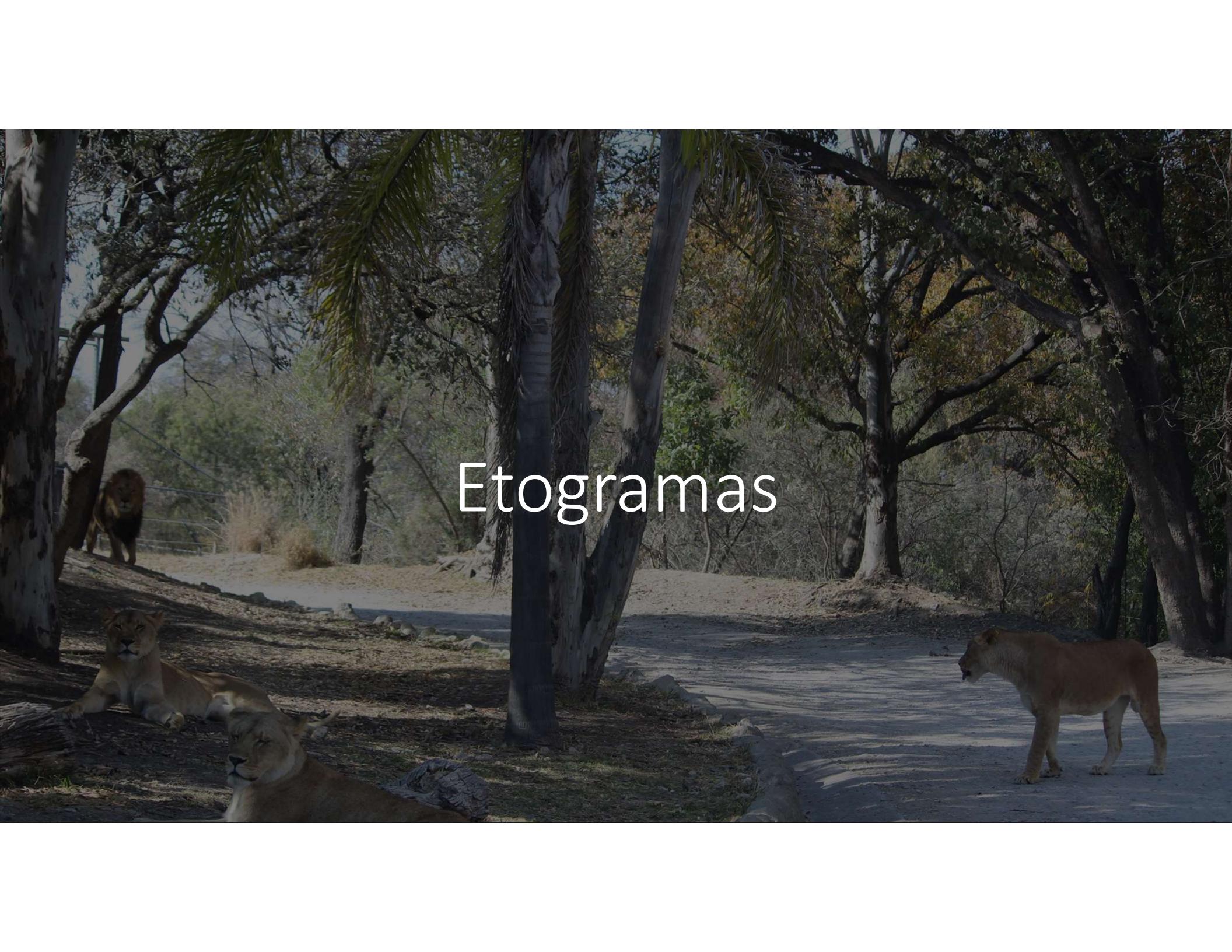
- Es el estudio de las relaciones entre los animales y el medio ambiente que les rodea.



¿Por qué es importante estudiar el comportamiento animal?

- Entender el mundo que nos rodea
- Predicción y aplicaciones prácticas
- Conservación
- Academia

¿Cómo estudiamos la conducta?

A photograph of lions in a naturalistic enclosure. In the foreground, a lioness lies down on the left, another stands on the right, and a third is walking away in the background. The setting is a dirt path surrounded by trees and foliage.

Etogramas

¿Qué son?

- Es una lista descriptiva de todos los patrones de comportamiento que tiene un animal en su repertorio.





¿Qué debe contener un etograma?

Definición clara de las conductas a observar

Table 6

A standardized ethogram for the Felidae including definitions for all base behaviors. Definitions are provided for all words listed in bold font.

Title	Definition
Allogroom	Cat licks the fur of another cat's head or body.
Arch back	Cat curves back upwards and stands rigidly.
Approach	Cat moves toward (modifier) while looking at it.
Attack	Cat launches itself at (modifier) with extended forelegs and attempts to engage in physical combat.
Avoid	Cat moves, or changes direction while moving, in order to keep away from (modifier).
Bare teeth	Cat opens its mouth slightly while pulling lips back to expose teeth.
Bite	Cat snaps teeth at and is successful in biting (modifier).
Body rub ^a	Cat rubs any part or entire length of body against (modifier).
Body shake	Cat rotates its abdomen from side to side.
Carry	Cat picks (modifier) up off the ground and moves it to another location.
Charge	Cat rushes toward (modifier).
Chase	Cat runs rapidly in pursuit of (modifier).
Chew	Cat grinds an object in its mouth using the teeth.
Clawing	Cat drags front claws along an object or surface, likely leaving visual marks behind.
Climb	Cat ascends and/or descends an object or structure.
Copulation	Male mounts female and intromission is achieved.
Crouch	Cat is alert and positions the body close to the ground, whereby all four legs are bent, and the belly is touching (or raised slightly off of) the ground.
Cuff	Cat strikes at (modifier) with forepaw and contact is made. Claws are usually extended.
Defecate	Cat releases feces on the ground while in a squatting position.
Dig	Cat breaks up or moves substrate around with its paws.
Displace	Cat provokes an avoidance behavior from another cat.
Drag	Cat moves (modifier) from one location to another without picking it up off the ground.
Drink	Cat ingests water (or other liquids) by lapping up with the tongue.
Ears back	Ears are held at the rear of head (UKCBWG, 1995).
Ears erect	Cat points its ears upward (UKCBWG, 1995).

Categorías funcionales

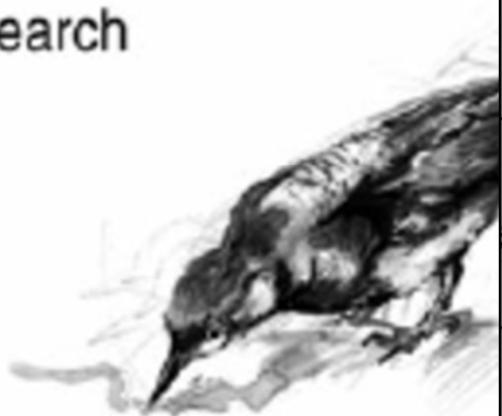
Table 7

Base behaviors that fall within each behavioral category. Definitions for each category are listed in the online supplementary material.

Active	Affiliative	Aggressive	Agonistic	Calm	Exploratory	Fear
Carry	Anogenital sniff	Attack	Approach	Ears erect	Chew	Avoid
Clawing	Follow	Bare teeth	Arch back	Groom	Dig	Crouch
Crouch	Gurgle ^a	Bite	Avoid ^a	Kneading	Drag	Ears back
Defecate	Head butt ^a	Charge	Bare teeth ^a	Lying ^a	Ears erect	Excess salivation
Drag	Huddling ^a	Chase	Bite	Purr	Ears forward	Flee
Drink	Lick	Crouch	Chase	Scratching	Explore	Flinch ^a
Ears erect (alert)	Nuzzle	Cuff	Cuff	Sitting	Flehmen	Freeze ^a
Ears forward (alert)	Play	Ears back ^a	Displace	Stretching	Investigate	Groom
Eat	Prusten ^a	Ears flat	Ears back	Yawn ^a	Lick	Head shake
Explore	Puff ^a	Fight	Fight		Manipulate object	Hiding
Fight	Play roll on back ^a	Ground slap ^a	Flee		Paw	Hiss
Forage	Sniff nose	Growl	Ground slap ^a		Rear ^a	Retreat
Groom	Social groom/allogroom	Kill bite ^a	Growl		Sniff (any)	Tail under
Hunt	Social roll	Piloerection	Hiss		Watch ^a	Trembling
Investigate (all types)	Social rub/allorub	Pounce	Piloerection ^a			
Locomotion (all types)	Social sniff	Rake ^a	Raise paw ^a			
Play	Stutter ^a	Rear ^a	Retreat			
Rear	Tail up ^a	Snarl	Roll on back			
Roll (solitary)	Touch noses	Spit	Snap bite			
Rub (object)		Strike at	Snarl			
Scratching		Tail slap ^a	Social stare			
Sniff (all types)		Tail swish	Strike at ^a			
Allogroom		Tail twitch	Tail over			
Standing		Threaten	Tail under			
Stretching		Yawn ^a	Yowl			
Urinate						

Behavioral category

Search

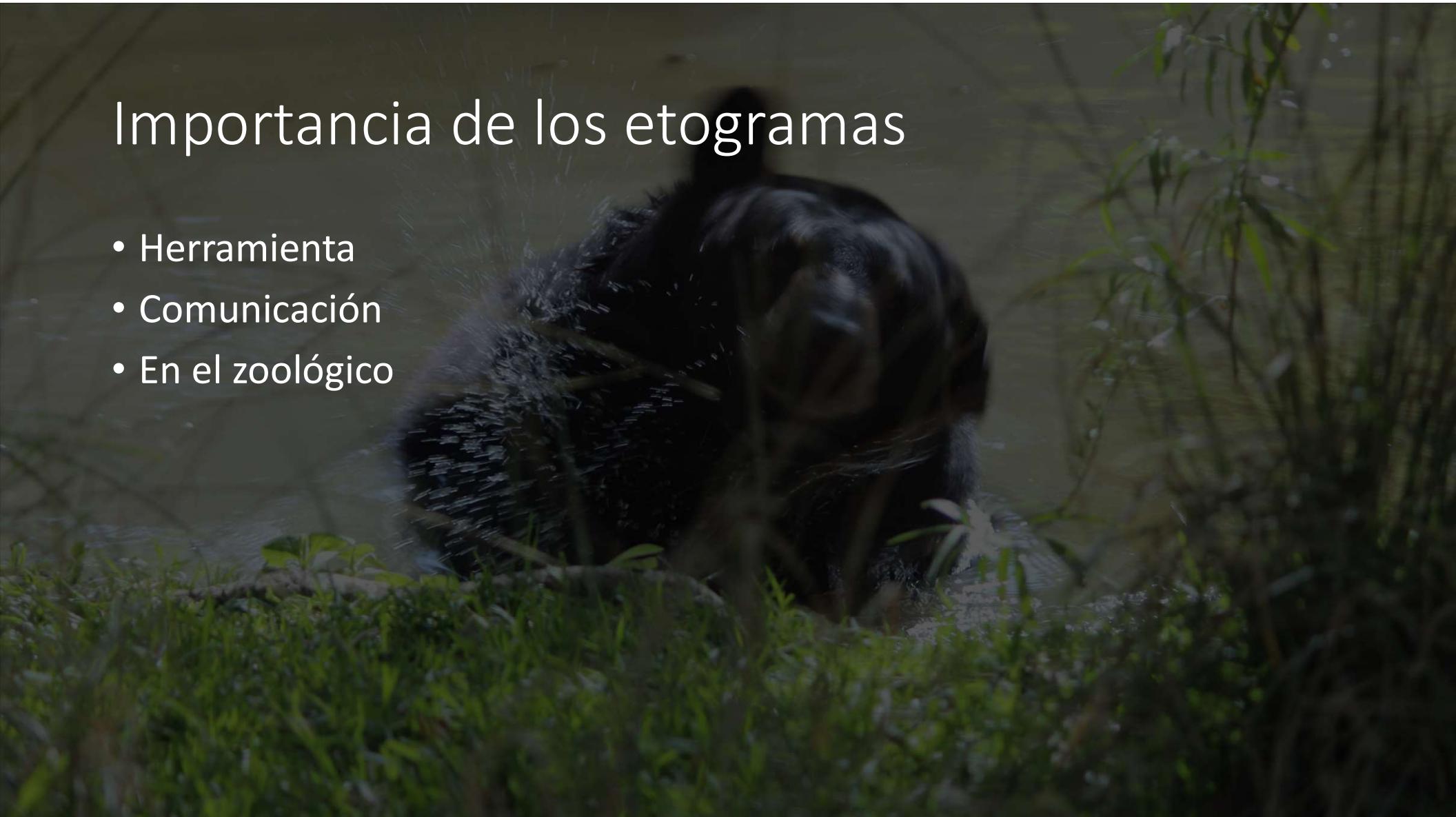


Behavioral category	Description
Search	 Focal bird searches for food using either vision or touch. Tactile search refers to probing the mud with the tip of the bill (knots) or rooting through seaweed (turnstones).
Handle	 Focal bird is in physical contact with a prey item. A distinction is made between prey previously undiscovered, prey previously rejected (knots) and prey stolen from others.
Interact	 Focal bird either initiates an interaction by taking up a threatening position or by moving quickly towards the opponent, or responds to a threatening or attacking non-focal bird by moving away from this opponent.
Vigilant	 Focal bird is looking around (head up): vigilance encompasses alertness directed at other birds (actually a form of interaction) and that towards some other aspect of the environment, as no distinction could reliably be made.
Other	 Focal bird is preening its feathers or pecking its identification mark.

searches for food
or vision or touch.
search refers to probing
with the tip of the bill
rooting through
seaweed (turnstones).

Importancia de los etogramas

- Herramienta
- Comunicación
- En el zoológico



¿Cómo hacer un etograma?

1. Observaciones preliminares
2. Genera un etograma general
3. Formula pregunta e hipótesis
4. Decide que conductas serán registradas
5. Investiga la biología general de la especie

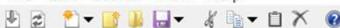
¿Donde encontrar esta información?

Búsqueda de bibliografía

- Google Scholar: <https://scholar.google.com.mx/>
 - Microsoft Academic: <https://academic.microsoft.com/home>
 - Biblioteca digital de la Universidad
 - Sci-hub y libgen
-
- Publish or perish: <https://harzing.com/resources/publish-or-perish>
 - Dimensions <https://app.dimensions.ai/discover/publication>
 - Connected papers: <https://www.connectedpapers.com/>
 - Papers <https://app.readcube.com/>

Harzing's Publish or Perish (Windows GUI Edition) 7.21.2812.7445

File Edit Search View Help



My searches	Search terms	Source	Papers	Cites	Cites/ye...	h	g	hl,norm	hl,annual	acc10	Search date	Cache date	Last...
Trash	✓ Ethogram [title]	G Google Sch...	399	5217	62.11	37	62	26	0.31	4	2020-06-17	2020-06-17	0
	✓ environmental enrichment, Wist...	Crossref	200	1971	28.99	23	41	17	0.25	1	2020-06-15	2020-06-15	0
	✓ environmental enrichment, open...	Crossref	200	2718	39.97	27	48	21	0.31	2	2020-06-15	2020-06-15	0

Google Scholar search

How to search with Google Scholar

Authors:	<input type="text"/>	Years:	0	-	0	<input type="button" value="Search"/>
Publication name:	<input type="text"/>					ISSN: <input type="text"/>
Title	<input type="text" value="Ethogram"/>					<input type="button" value="Search Direct"/>
Keywords:	<input type="text"/>					<input type="button" value="Clear All"/>
						<input type="button" value="Revert"/>
Maximum number of results:	<input type="text" value="1000"/>	<input type="button" value="▼"/>	(may be further limited by data source)			
New	<input type="button" value="▼"/>					

Dimensions

Environmental enrichment AND ...

FILTERS FAVORITES

PUBLICATIONS DATASETS GRANTS PATENTS CLINICAL TRIALS

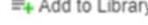
44,020 3,187 14 1,014 0

POLICY DOCUMENTS 325

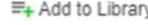
Show abstract Sort by: Relevance

Title, Author(s), Bibliographic reference - About the metrics

Evaluation of Enrichment for Reptiles in Zoos
Taylor Eagan
2018, Journal of Applied Animal Welfare Science - Article
Studies on environmental enrichment for reptiles are lacking in the scientific literature. Although the literature reflects a limited take on reptile enrichment in the zoological community, it may not... [more](#)

 4 

Unraveling the Complexity of the Zoo Community: Identifying the Variables Related to Conservation Performance in Zoological Parks
María C. Fàbregas, Federico Guillén-Salazar, Carlos Garcés-Narro
2011, Zoo Biology - Article
Zoological parks make up a highly heterogeneous community. Ranging from small collections at shopping malls to highly developed bioparks, their contribution to conservation is expected to vary enormously... [more](#)

 1 

Relative response to digital tablet devices and painting as sensory enrichment in captive chimpanzees
Priscilla P. Grunauer, Justin W. Walguarnery

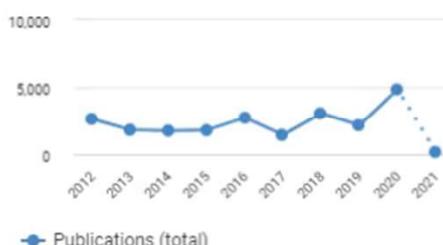
ANALYTICAL VIEWS

RESEARCH CATEGORIES

06 Biological Sciences 7,744
0602 Ecology 2,952
07 Agricultural and Veterinary Sciences 2,298
11 Medical and Health Sciences 2,258
05 Environmental Sciences 1,976

OVERVIEW

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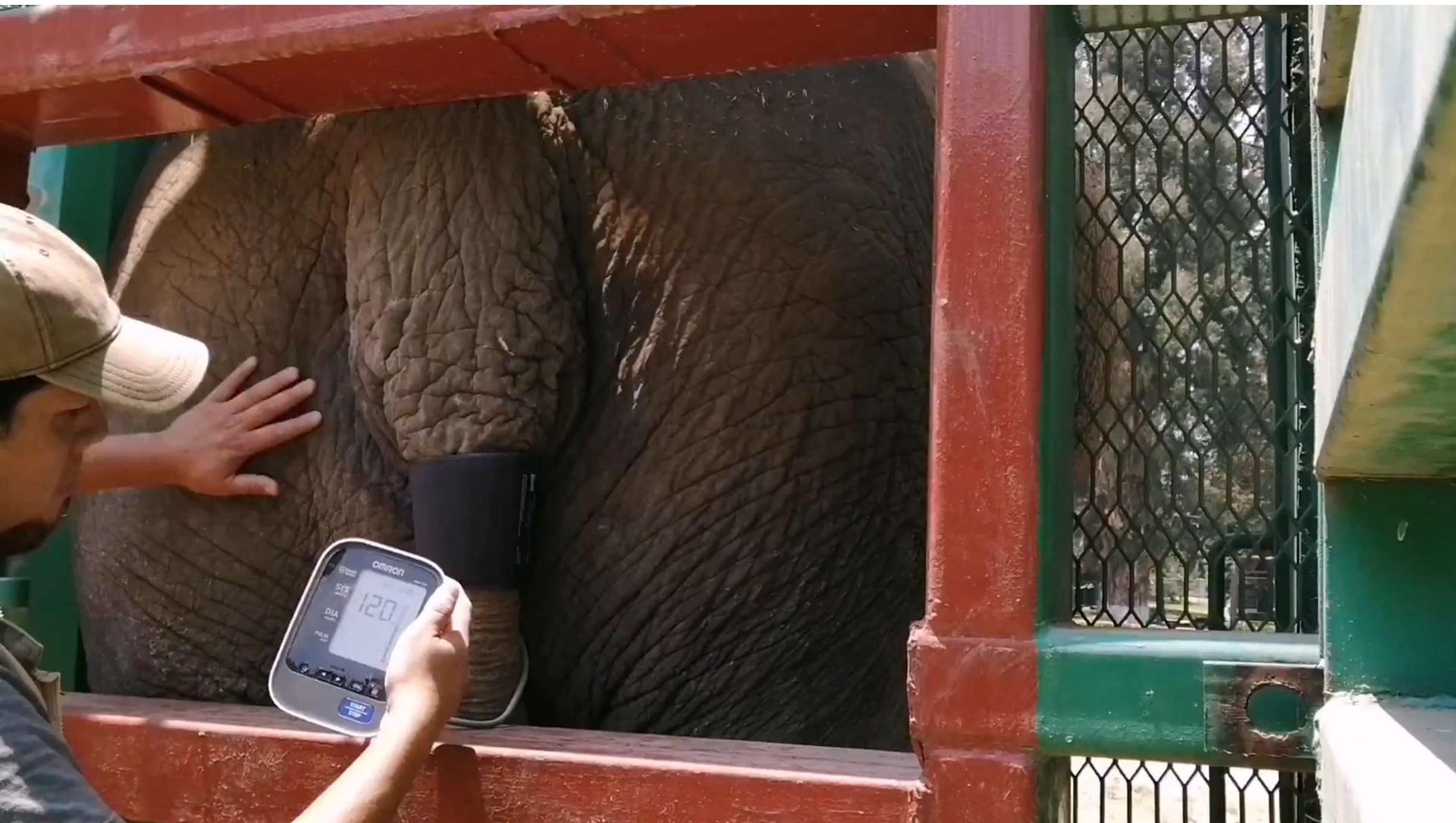
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Programas de entrenamiento



Sistema de tres pasos

- Planear
- Documentar
 - Simple: Tipo calendario, en donde, la información de la sesión de entrenamiento se escribe diariamente, es decir, que tipo de conducta será entrenada
 - Detallada (e.g., escalas Likert)
 - Compleja (e.g., BORIS, Animal Behavior, ZooMonitor, Deeplabcut)
- Evaluar
- Reajustar





Formato de Propuesta de Nuevos Entrenamientos.

Entrenador: _____ Área: _____

Área:

Fecha de Presentación:

Propuesta(s) de Entrenamiento: _____

Especie: Nombre: ISIS#:

Objetivos del entrenamiento:

Tiempos de entrenamiento propuestos:

Tiempo estimado disponible para el entrenamiento:

1

minutos
por día

1

sesión(es)
por semana

¿Se cuenta con un tiempo determinado para lograr el desarrollo de un comportamiento específico?

No Si Describa:

Refuerzos (incluyendo específicamente el tipo y la cantidad):

Primario: Por día Por sesión

Condicionado: a) Puente b) Otro

¿Existe algún tipo de reto, modificación, o reestructuración en la rutina para que se lleve a cabo la sesión de entrenamiento?

Herramientas a utilizar:

Silbato Clicker Target(s) Formatos Otros:

Aprobado por:

Gerente de Colección y Bienestar Animal

Sistema de tres pasos

- Planear
- Documentar
 - Simple: Tipo calendario, en donde, la información de la sesión de entrenamiento se escribe diariamente, es decir, que tipo de conducta será entrenada
 - Detallada (e.g., escalas Likert)
 - Compleja (e.g., BORIS, Animal Behavior, ZooMonitor, Deeplabcut)
- Evaluar
- Reajustar

MARTES 1	MIERCOLES 2	JUEVES 3	VIERNES 4	SABADO 5	DOMINGO 6	LUNES 7	MARTES 8	MIERCOLES 9
JAGUAR	TIGRILLOS	PECARIS	OSOS	PUMA	CUCHUCHOS	OSOS	JAGUAR	PUMA
M. MACHINES	TAIRA	MAPACHE	TAPIR	M. CHORONGOS		TAPIR	M. MACHINES	M. CHORONGOS
VENADOS	LEONES	CUSUMBOS	M.COTONCILL O	CERVICABRA	M. SAIMIRIS	ZARIGUEYA	VENADOS	CERVICABRA
BUHOS	AGUILAS	GUACAMAYO S	AVESTRUZ	GUARROS	CONDOR	AVIARIO	BUHOS	AVESTRUZ
BORREGOS	YEGUA	BURRITA	LLAMAS			CHIVOS	BORREGOS	YEGUA
	GALAPAGOS					T. MOTELOS		
JUEVES 10	VIERNES 11	SABADO 12	DOMINGO 13	LUNES 14	MARTES 15	MIERCOLES 16	JUEVES 17	VIERNES 18
TIGRILLOS	PECARIS	OSOS	CUCHUCHOS	JAGUAR	PUMA	OSOS	TIGRILLOS	PECARIS
TAIRA	MAPACHE	TAPIR	M. CHORONGOS	M. MACHINES		TAPIR	TAIRA	MAPACHE
M. COTONCILLO	CUSUMBOS	LEONES	M. SAIMIRIS	ZARIGUEYA	CERVICABRA	VENADOS	CUSUMBOS	M. COTONCILL O
AGUILAS	GUACAMAYOS	BUHOS	GUARROS	AVIARIO	AVESTRUZ	AGUILAS	GUACAMAYOS	CONDOR
BURRITA	LLAMAS			CHIVOS	BORREGOS	YEGUA	BURRA	LLAMAS
	HERPETARIO A					GALAPAGOS		

Sistema de tres pasos

- Documentar
 - Simple: Tipo calendario, en donde, la información del EA se escribe diariamente, como el tipo de EA utilizado
 - Detallada: Reporte detallado que incluye el nivel de participación del animal con el objeto (e.g., escalas Likert)
 - Compleja (e.g., BORIS, Animal Behavior, ZooMonitor, Deeplabcut)
- Evaluar
- Reajustar cuando sea necesario.

Formato Diario de Condicionamiento



Lista de Comportamientos		Especie	
Clave	Comportamiento	Nombre de Casa:	
		Nombre Común:	
		Nombre Científico:	
		Sexo:	
		ID:	
		Ubicación:	
Fecha	Entrenador	Comportamiento	Respuesta
Observaciones Conductuales / Fisiológicas / Otras:			

Tiempo promedio de la sesión de entrenamiento: _____ (Minutos)

Actitud del animal durante el entrenamiento: _____

Comportamientos Entrenados

Cuadro Descriptivo	
Comportamiento	Descripción

Comportamientos Entrenados					
Comportamiento	Comando Verbal	Seña	Criterios de Refuerzo	Materiales Ocupados	Proyección

Información Extra

Realice una lista de comportamientos únicos, problemas de agresión, seguridad que afecten el entrenamiento:

¿Qué desencadena dicho comportamiento?

¿Cómo haces frente a esto?

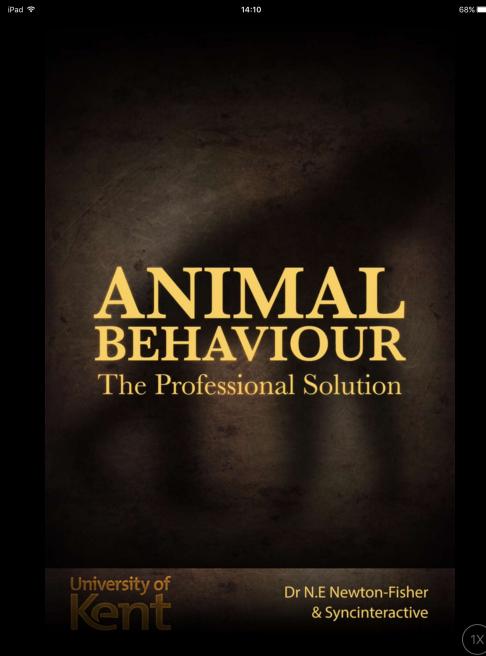
El animal está condicionado para entrar a:

Kennel
Jaula
Manga

¿Puede ser transportado?

Desventajas

- Registro conductual deficiente: Frecuencia de interacción, no tiempo ni la tasa de error de las conductas entrenadas
- Registro subjetivo de la eficacia
- Nula replicación externa
- Análisis de datos deficiente



Documentación compleja: Uso de apps para el registro conductual

Algunas Apps disponibles

- Animal Behavior Pro: <https://apps.apple.com/us/app/animal-behaviour-pro/id579588319>
- BORIS: <https://www.boris.unito.it/>
- Animal observer: <https://apps.apple.com/us/app/animal-observer/id991802313>
- Behayve: <https://www.behayve.com/>
- ZooMonitor: <https://zoomonitor.org/home>
- Lince PLUS: <https://github.com/observespport/lince-plus/releases/tag/v1.2.0>
- ChronoViz: <http://www.chronoviz.com/index.html>
- Cowlog 3: <http://cowlog.org/>
- Jwatcher: <http://www.jwatcher.ucla.edu/>
- The Observer XT: <https://www.noldus.com/applications/animal-behavior-observation>



Friard, O., & Gamba, M. (2016). BORIS: a free, versatile open-source event-logging software for video/audio coding and live observations. *Methods in ecology and evolution*, 7(11), 1325-1330.



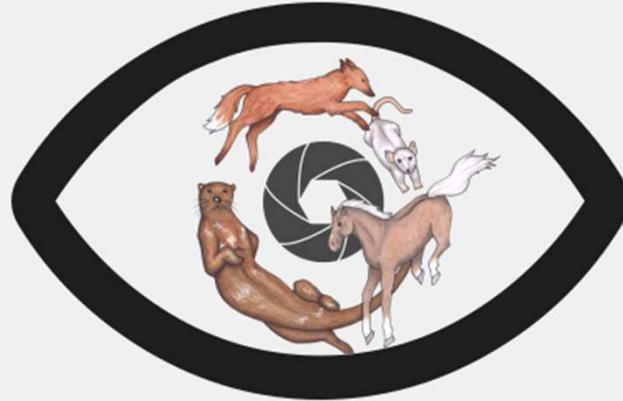
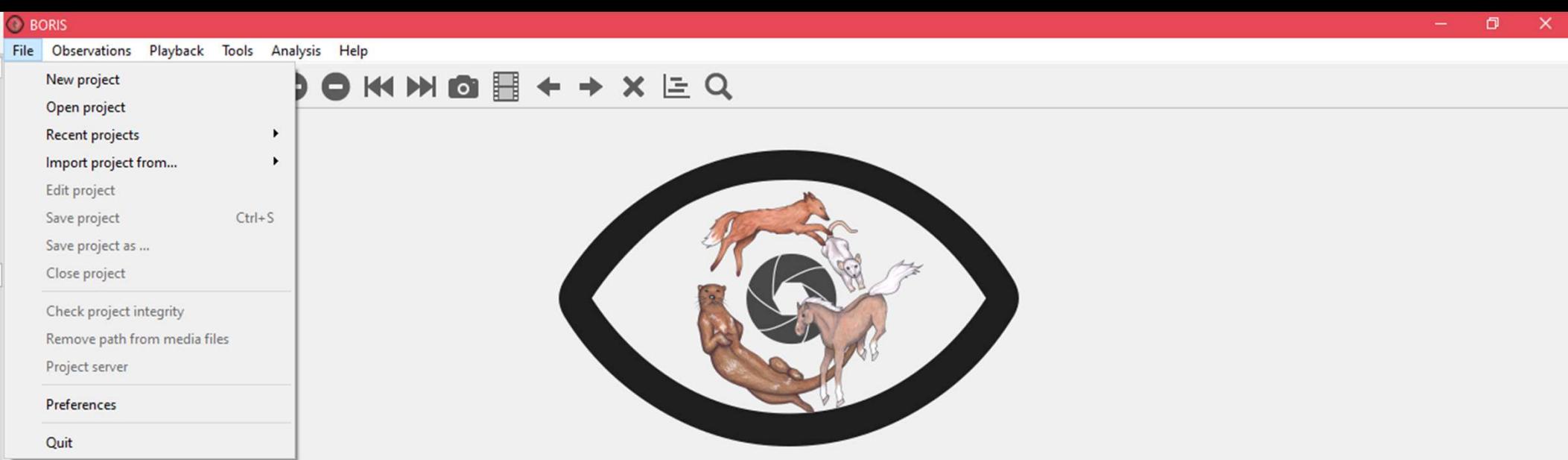
Guía Rapida:
<https://boris.readthedocs.io/en/latest/>

BORIS

File Observations Playback Tools Analysis Help



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edit project

? X

Information Ethogram Subjects Independent variables Observations Behaviors coding map Converters

Project name

Regularity in the feeding patterns of the Great Tailed Grackle (*Quiscalus mexicanus*)

Project file path: C:\Users\aleja\Downloads\Great Tailed Grackle (*Quiscalus mexicanus*).boris

Date

2018-01-29 18:55:59

Description

The main aim of this observational study is determine if the Great Tailed Grackle (*Quiscalus mexicanus*) shows certain patterns of feeding behavior in an urban environment.

Time format

seconds

hh:mm:ss.mss

Cancel

OK

edit project

?

X

Information Ethogram Subjects Independent variables Observations Behaviors coding map Converters

Behavior type	Key	Code	Description	Category	Modifiers	Exclusion	Modifiers coding map	
1 State event	0	At the observation site	This states the moment where the ...			Searching for food		Add behavior
2 Point event	f	Fly	The focal animal flies away from the ...			Searching for food		Clone behavior
3 State event	s	Searching for food	The focal animal pecks the ground, ...					Remove behavior
4 Point event	j	Jump	The focal animal jumps or make a ...			Searching for food		Remove all behaviors
5 Point event	d	Displacement	The focal animal banish another bird ...	{'0': {'name': 'Displacement event...}}		Searching for food		Behavioral categories
6 Point event	o	Out of the sight	The focal animal is out of the sight for ...			Searching for food		Convert keys to lower case
7 Point event	1	One subject	Indicates that only one animal is at the ...					
8 Point event	2	Two subjects	Indicates that more than one animal is a...					
9 Point event	3	Three subjects	Indicates that more than one animal is a...					
10 Point event	4	Four subjects	Indicates that more than one animal is a...					
11 Point event	5	Five subjects	Indicates that more than one animal is a...					
12 Point event	6	Six subjects	Indicates that more than one animal is a...					
13 Point event	7	Seven subjects	Indicates that more than one animal is a...					
14 Point event	8	Eight subjects	Indicates that more than one animal is a...					
15 Point event	9	More subjects	Indicates that more					

[Cancel](#)[OK](#)

Regularity in the feeding patterns of the Great Tailed Grackle (Quiscalus mexicanus) - BORIS

File Observations Playback Tools Analysis Help

- New observation Ctrl+N
- Start observation Ctrl+O
- View observation
- Edit observation Ctrl+E
- Observations list Ctrl+L
- Close observation Ctrl+Q
- Import observations
- Export observations list
- Add event Ctrl+A
- Edit selected event(s)
- Shift time of selected event(s)

Explore project

Find in events

Find/replace in events

Check state events

Fix unpaired events Ctrl+U

Select events from interval

Delete selected events

Delete all events

Export events ▾

Create subtitles

Extract sequences from media files

Extract frames from media files

Create transitions matrix ▾



Type	Description	Category	Modifiers	Excluded
event	This states the moment where the ...			Searching for food
event	The focal animal flies away from the ...			Searching for food
event	The focal animal pecks the ground, ...			
event	The focal animal jumps or make a ...			Searching for food
event	The focal animal banish another bird ...		{'0': {'name': 'Displacement event...}}	Searching for food
event	The focal animal is out of the sight for ...			Searching for food

Description	Current state(s)

New observation

Observation id: Date:

Description:

Independent variables

Variable	Type	
1 Time of day	timestamp	2017-10-25 00:00:00
2 Location	text	20°38'09.2"N 103°24'42"E

Time offset: + 0 :00 :00 :000 hh:mm:ss seconds

Limit observation to a time interval

Media Live

Media files Data files

Player	Offset (seconds)	Path	Duration	FPS	Video	Audio
--------	------------------	------	----------	-----	-------	-------

Add media Add media without path Remove selected media Add all media from directory Add all media from dir without path

Visualize the sound spectrogram for the player #1
 Visualize the waveform for the player #1
 Stop ongoing state events between successive media files

Cancel Save Start

File Observations Playback Tools Analysis Help



Ethogram

Player #1

Events for "pba" observation

	Key	Code
1	0	At the observation site
2	f	Fly
3	s	Searching for food
4	j	Jump
5	d	Displacement
6	o	Out of the sight



time	subject

Subjects

	Key	Name	Description
1		No focal subject	

InkedDesplazamiento.mp4: 00:00:00.000 / 00:00:10.867 (paused)

No focal subject



x1.000

File Observations Playback Tools Analysis Help**Etho**
1 New observation Ctrl+N
2 Start observation Ctrl+O
3 View observationEdit observation Ctrl+E
Observations list Ctrl+L

Close observation Ctrl+Q

Import observations

Export observations list

Add event Ctrl+A

Edit selected event(s)

Shift time of selected event(s)

Explore project

Find in events

Find/replace in events

Check state events

Fix unpaired events Ctrl+U

Select events from interval

Delete selected events

Delete all events

Export events

Create subtitles

Extract sequences from media files

Extract frames from media files

Create transitions matrix



Type	Description	Category	Modifiers	Excluded
event	This states the moment where the ...			Searching for food
event	The focal animal flies away from the ...			Searching for food
event	The focal animal pecks the ground, ...			
event	The focal animal jumps or make a ...			Searching for food
event	The focal animal banish another bird ...		{'0': {'name': 'Displacement event...}}	Searching for food
event	The focal animal is out of the sight for ...			Searching for food

Description	Current state(s)

Tabular events

Aggregated events

as behavioural sequences

as Praat TextGrid

for analysis with JWatcher

as behaviors binary table

Regularity in the feeding patterns of the Great Tailed Grackle (*Quiscalus mexicanus*) - BORIS

File Observations Playback Tools **Analysis** Help

Ethogram

	Key	Co	Category	Modifiers	Excluded	
1	0	At the obse			Searching for food	
2	f	Fly			Searching for food	
3	s	Searching for food	State event	The focal animal pecks the ground, ...		
4	j	Jump	Point event	The focal animal jumps or make a ...	Searching for food	
5	d	Displacement	Point event	The focal animal banish another bird ...	{'0': {'name': 'Displacement event...}}	Searching for food
6	o	Out of the sight	Point event	The focal animal is out of the sight for ...		Searching for food

Inter-rater reliability

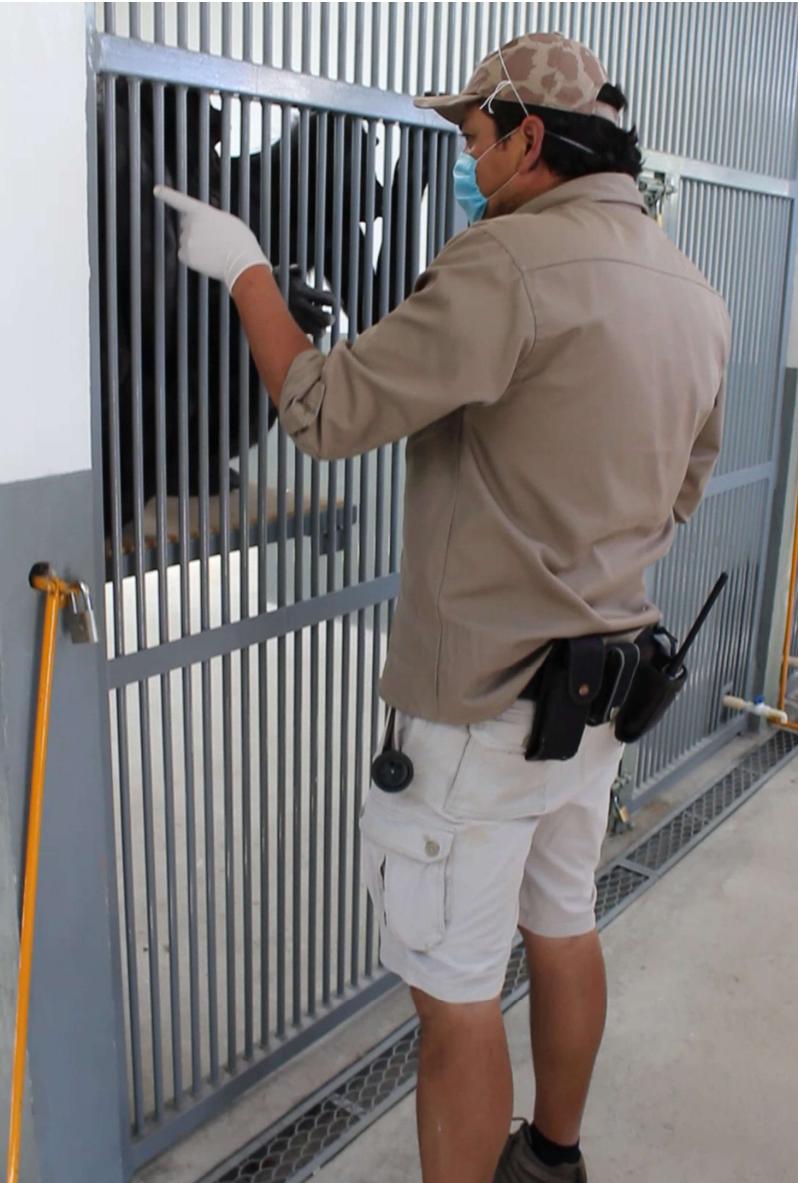
- Cohen's kappa (time-unit)
- Inter-rater time ...
- Similarities
- Advanced event filtering

Subjects

	Key	Name	Description	Current state(s)
1		No focal subject		

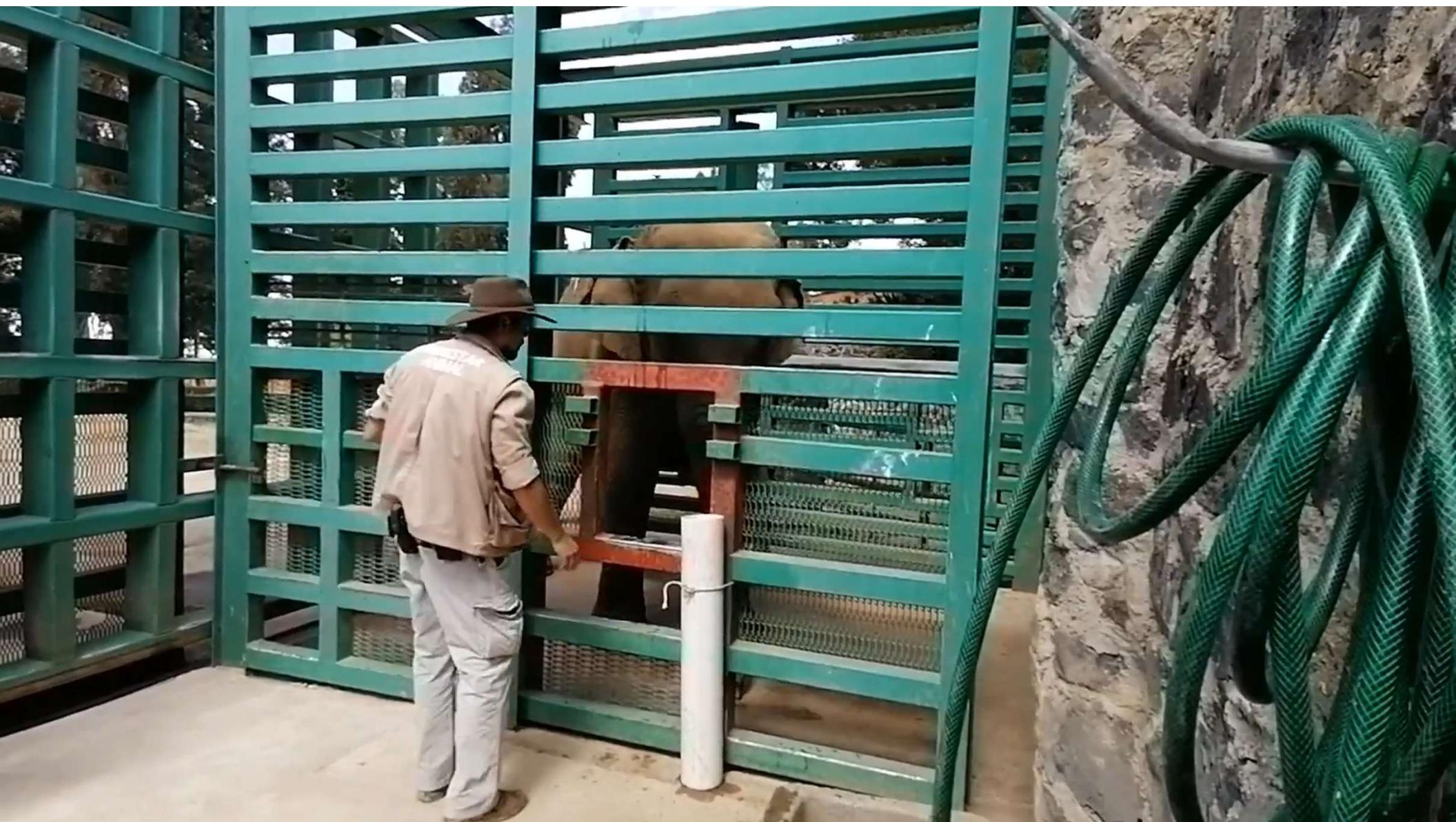


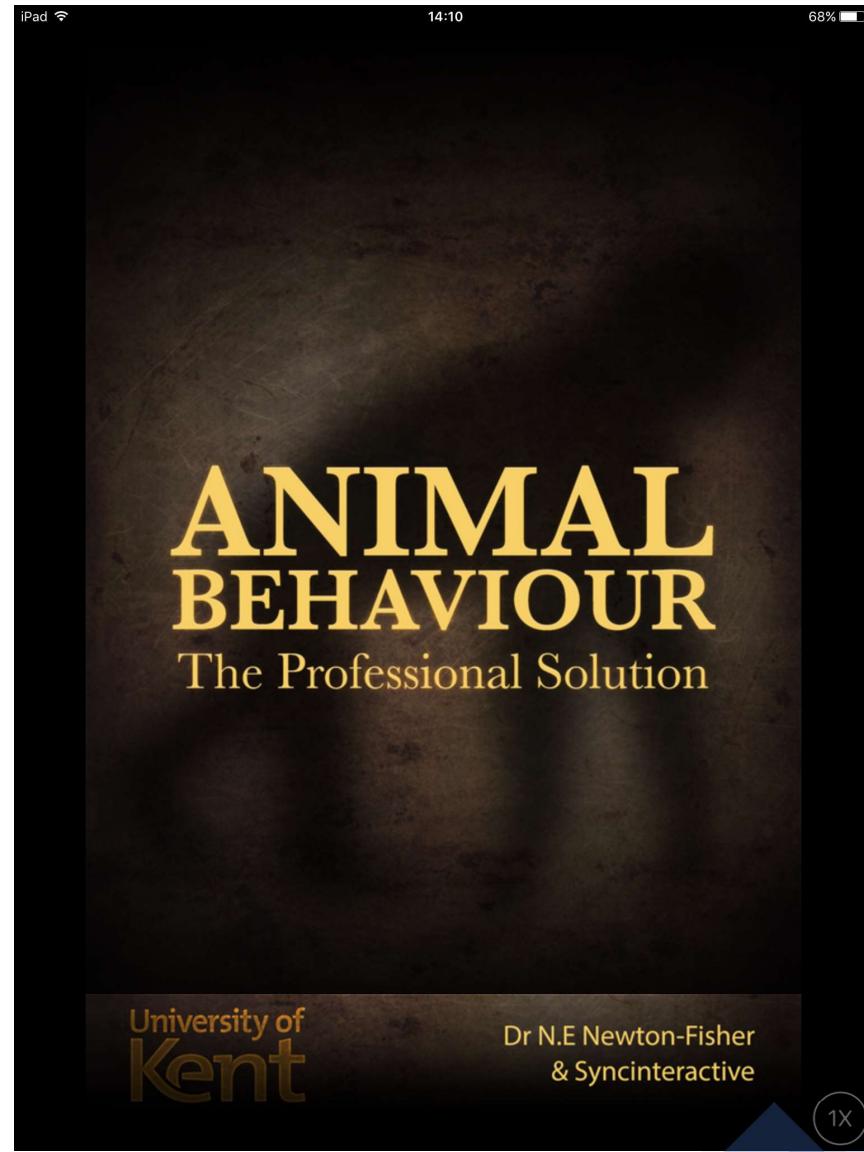
MOSTRAR
ANALISIS
DATOS
TOCONES



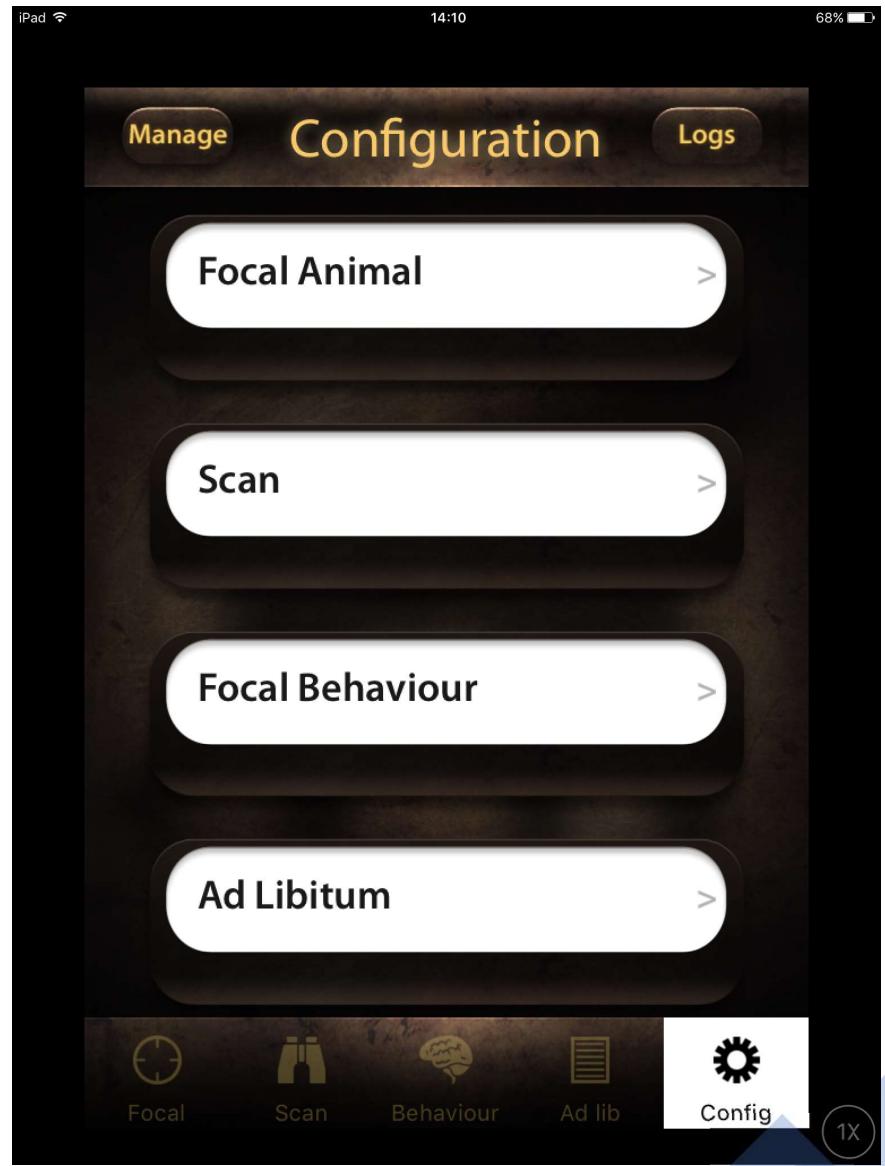
Evaluación de los programas de entrenamiento a través del uso de etogramas

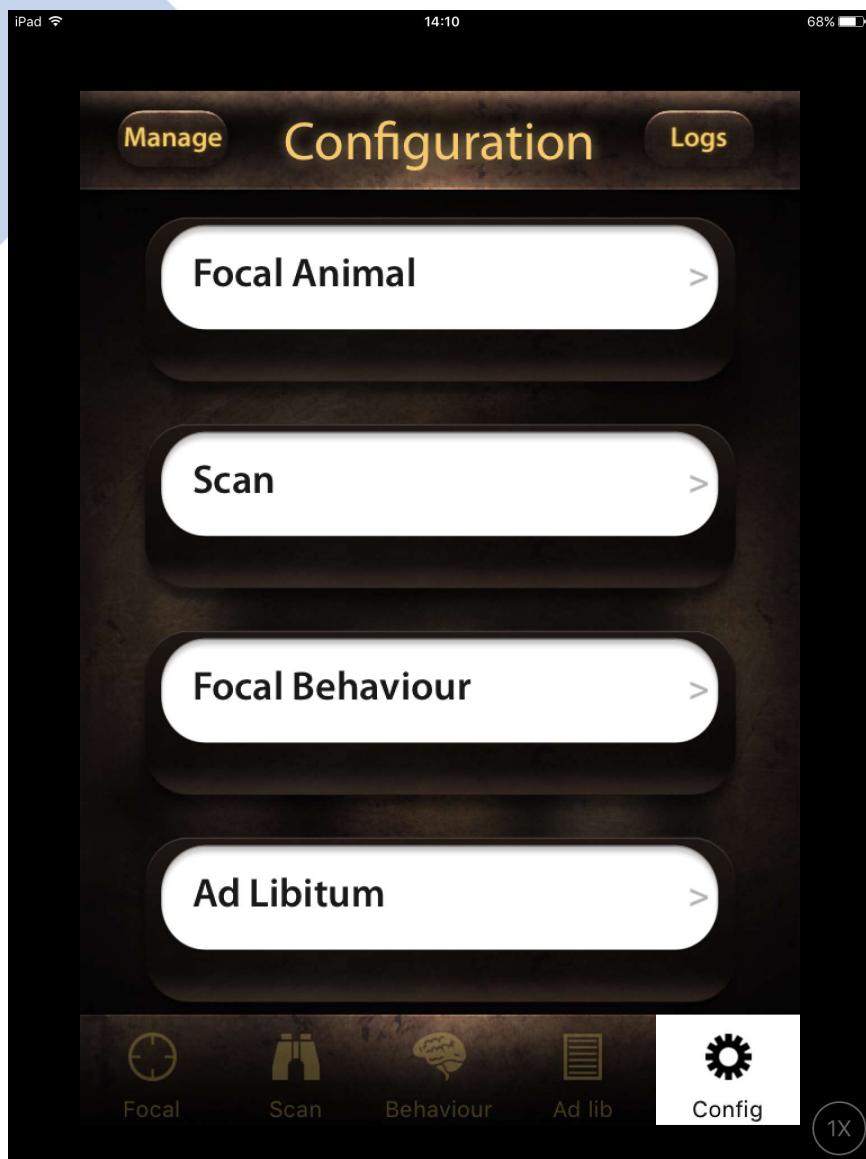
Longán, Rodrigo & Gomez-Medina (en
preparación)





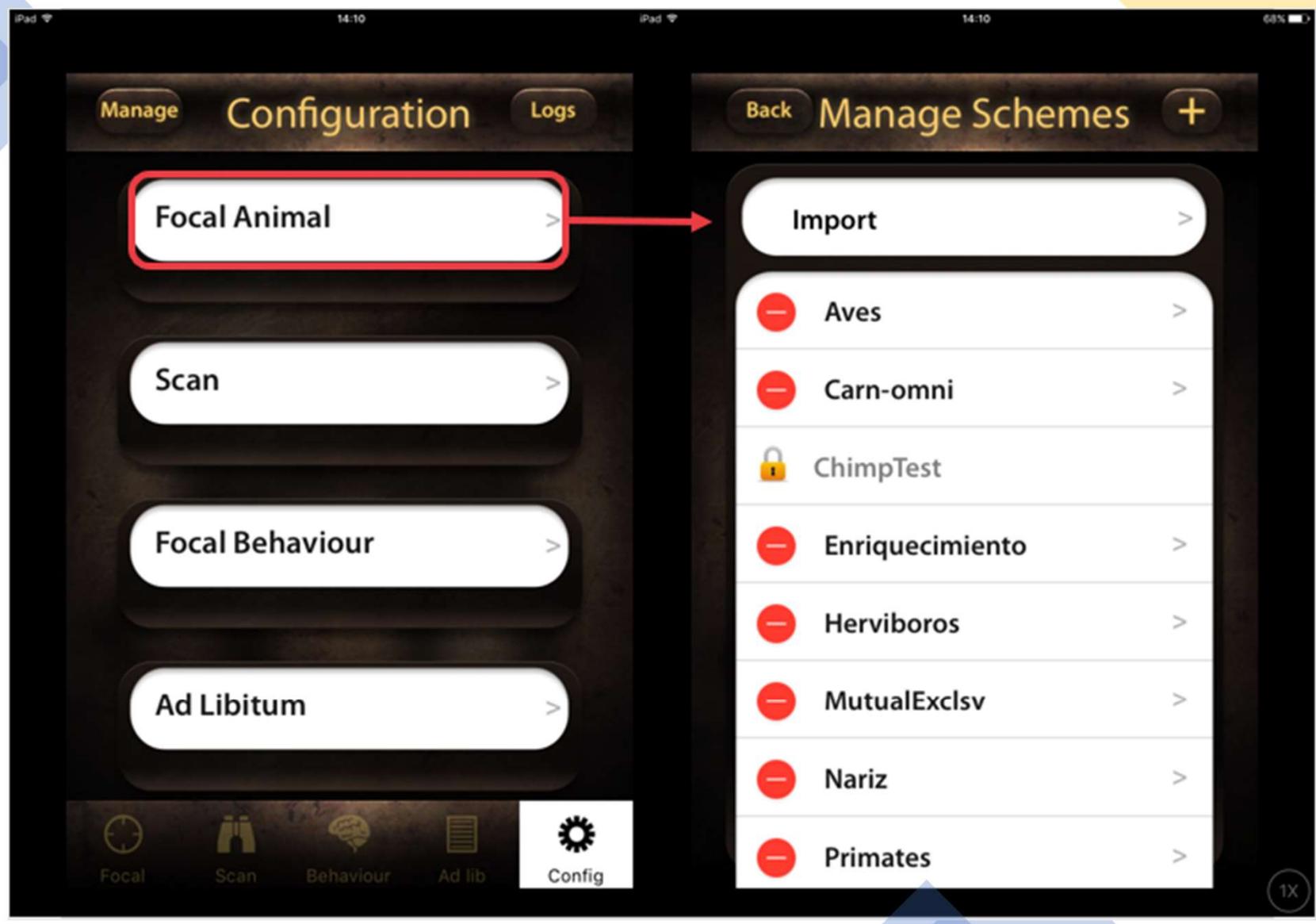
Guía Rapida
<https://www.youtube.com/watch?v=v9pLE9kpOnk>

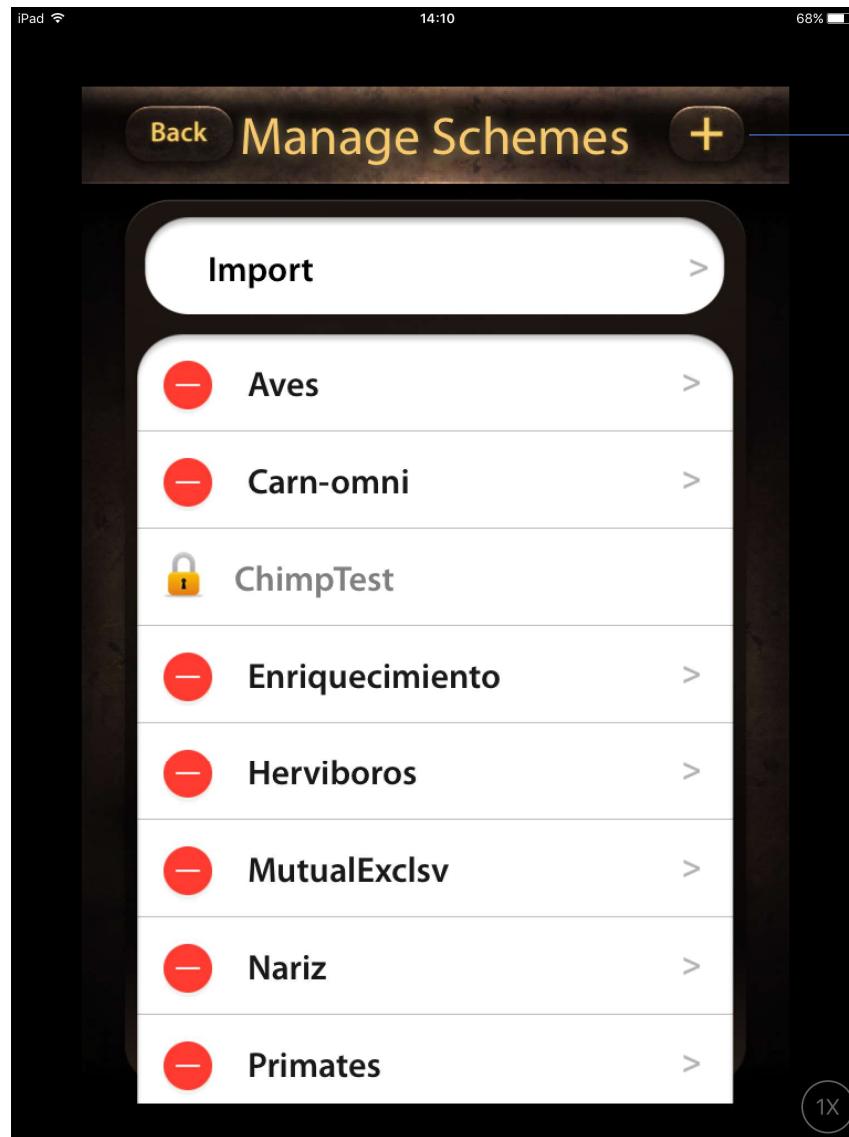




Almacenamiento de registros conductuales

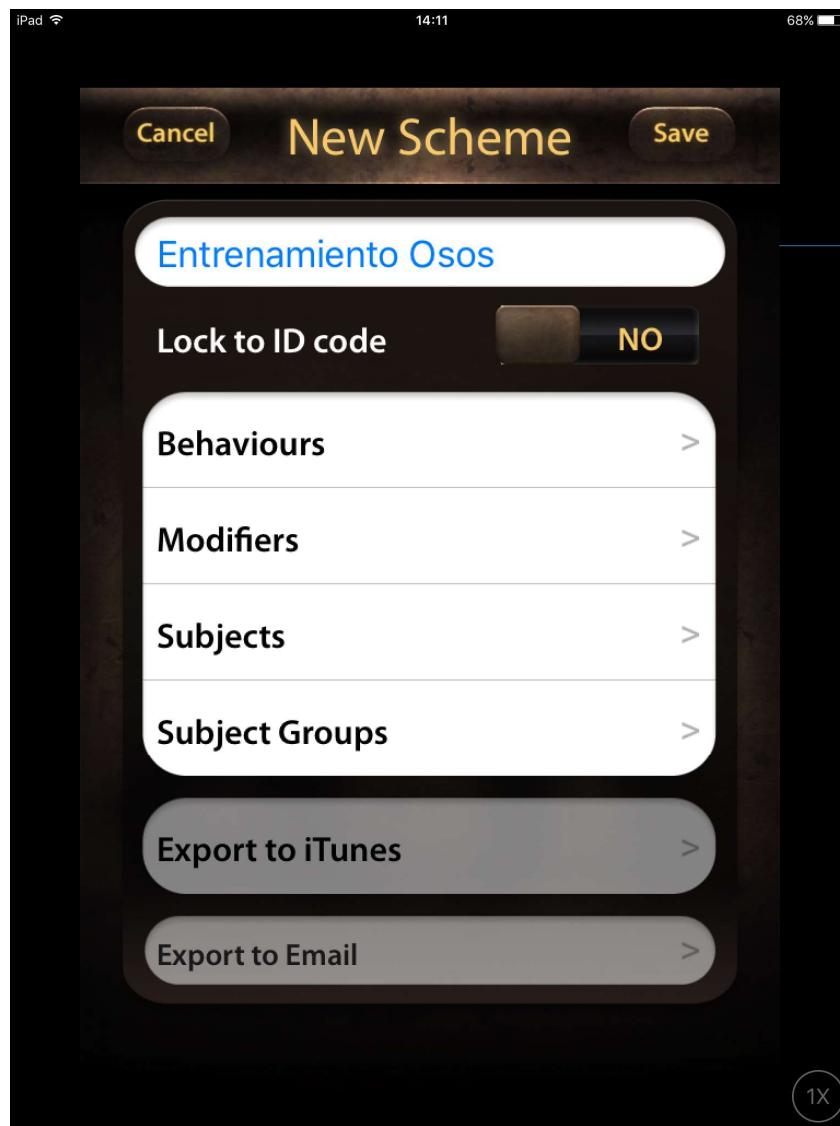
Tipos de registros observacionales





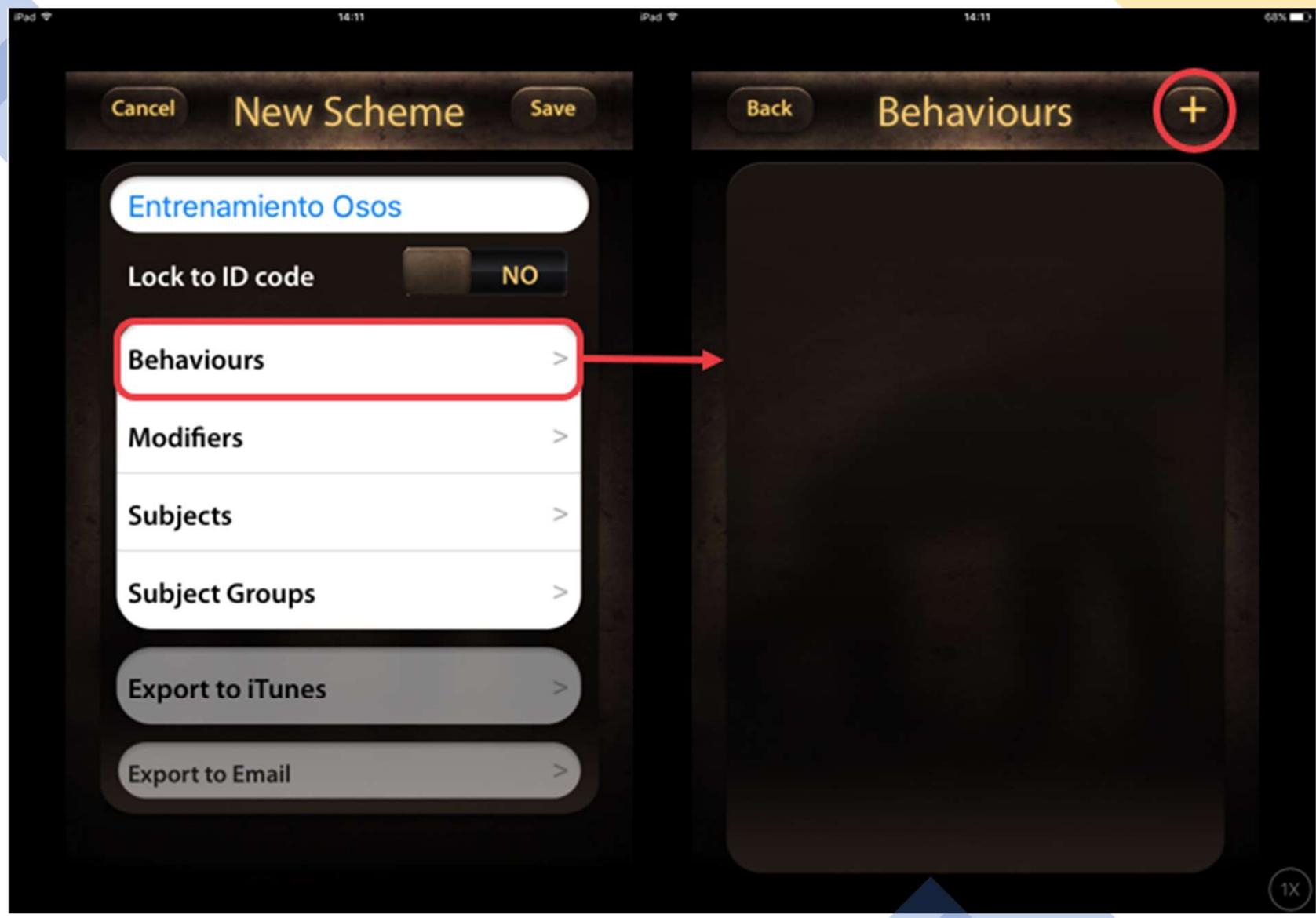
Agregar un etograma nuevo

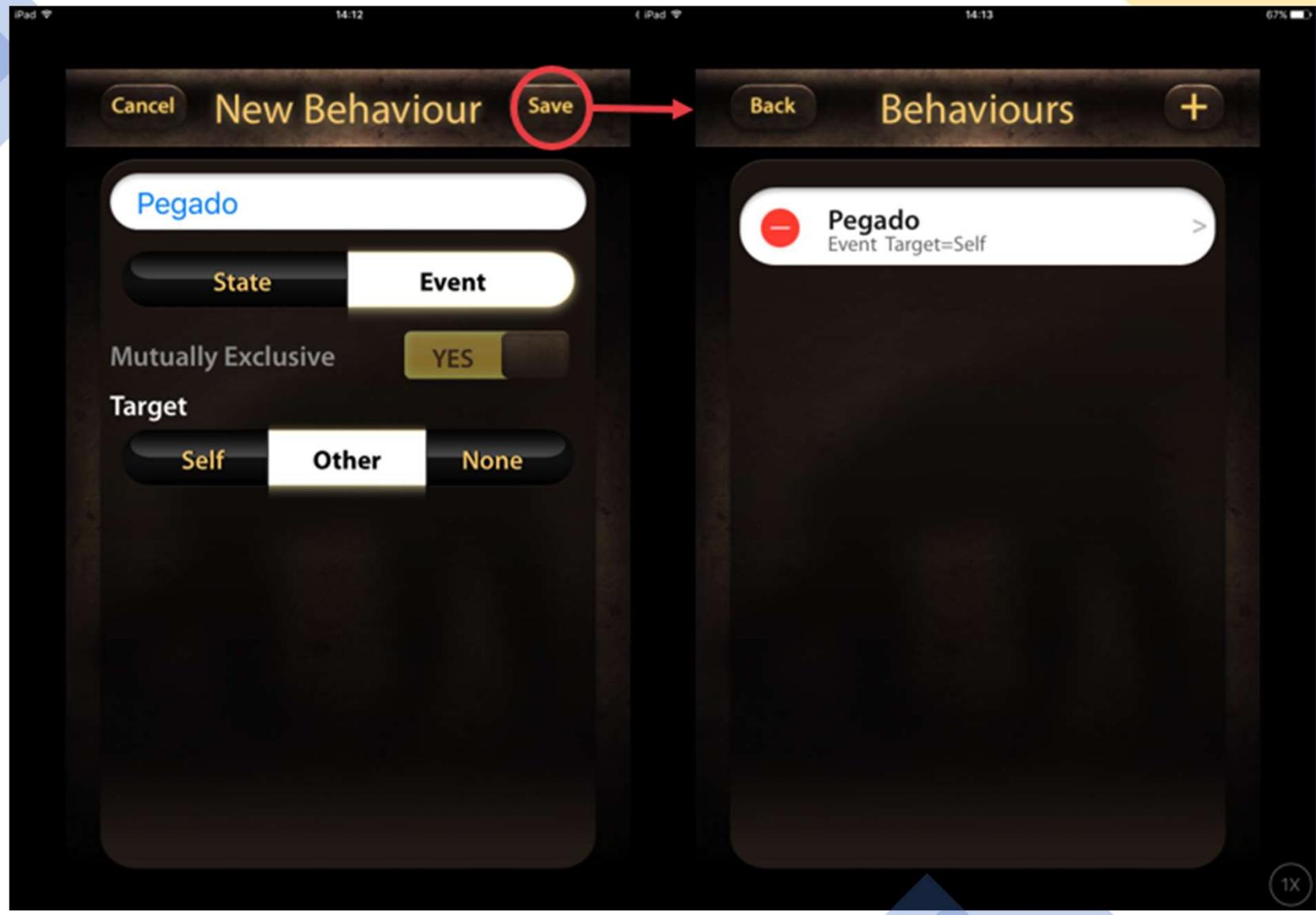
Lista de etogramas programados

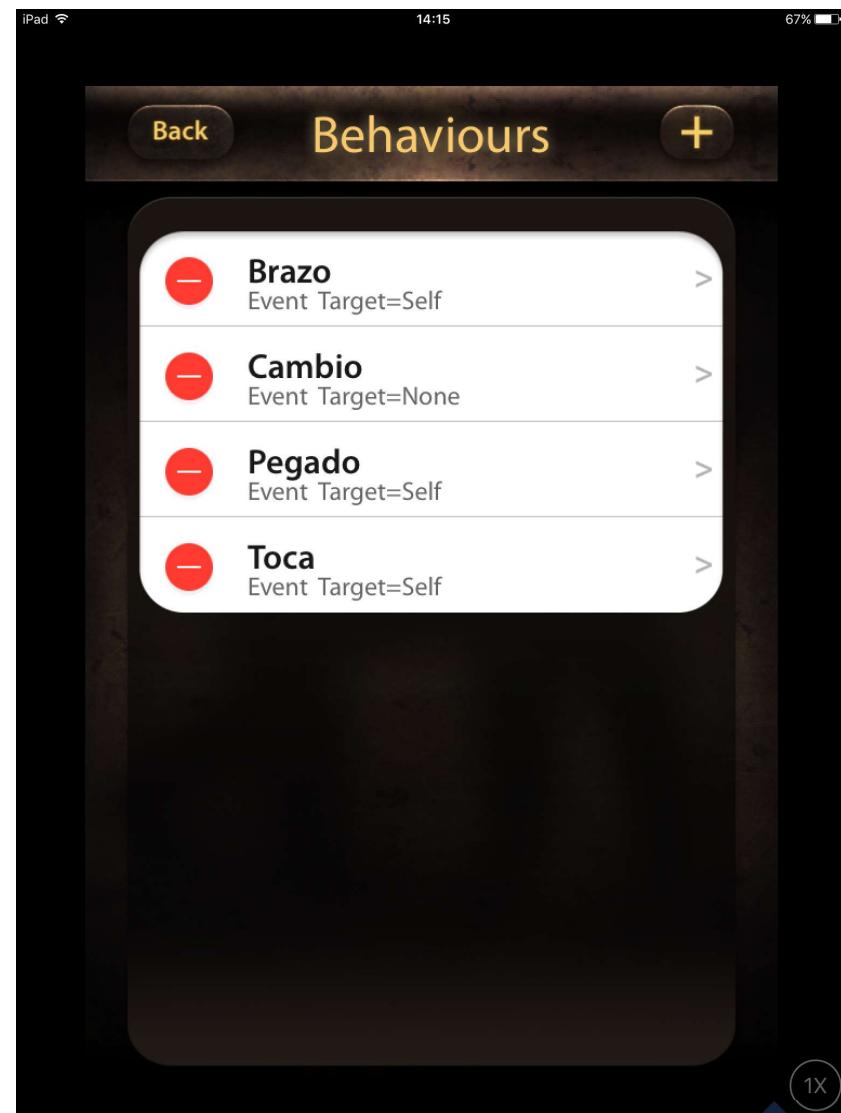


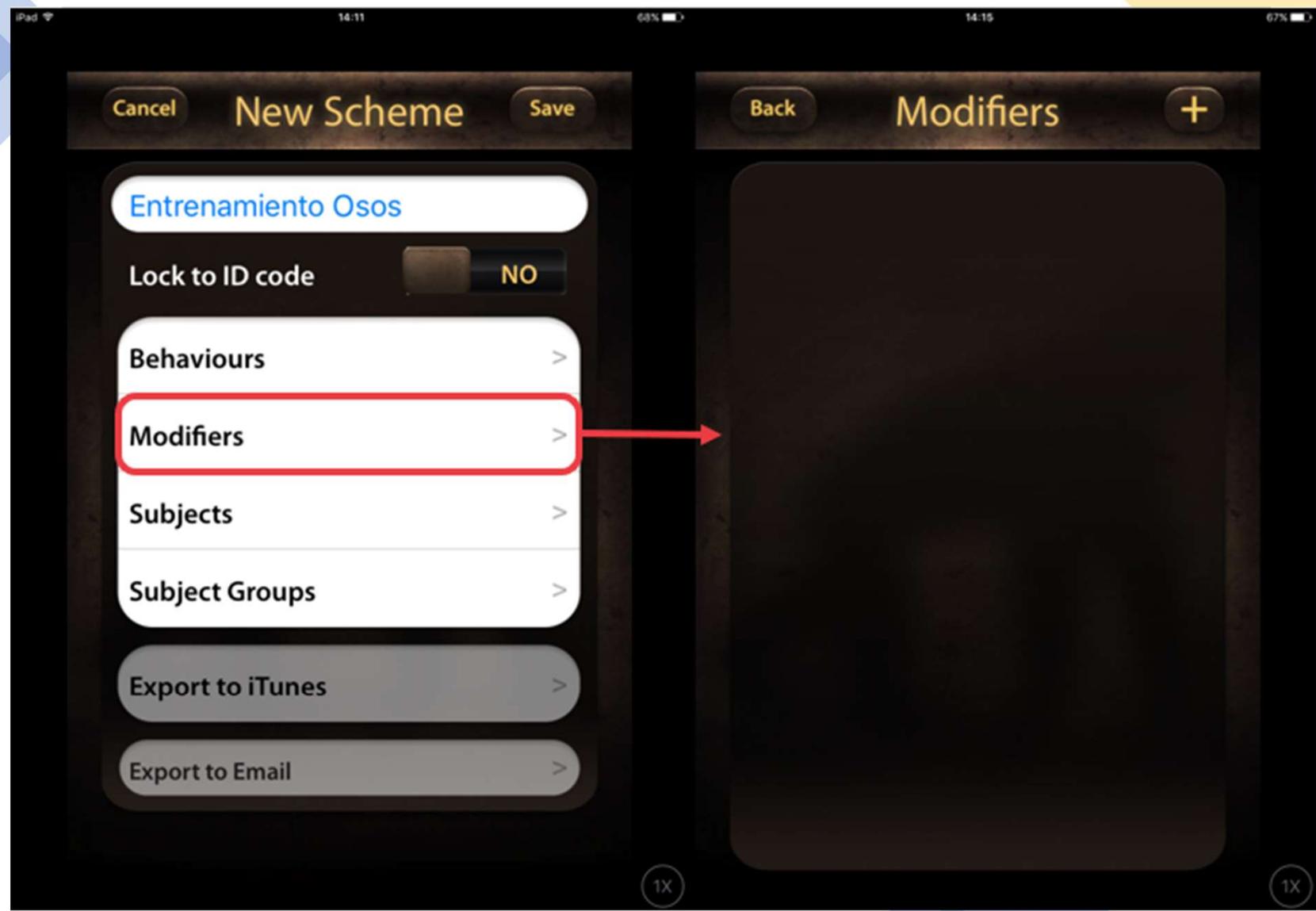
Nombre del etograma

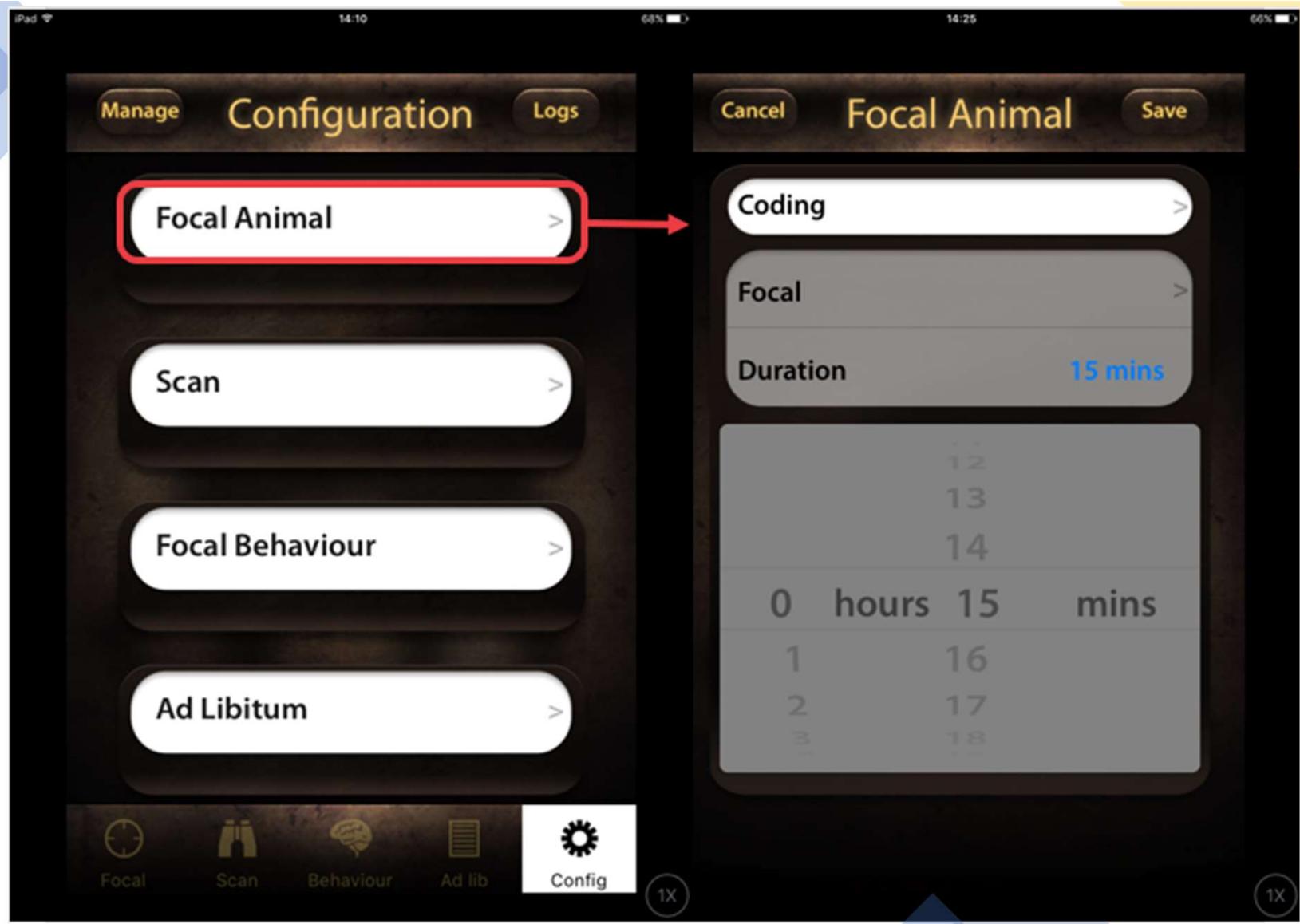
Lista de comportamientos, modificadores y sujetos a incluir en nuestro etograma

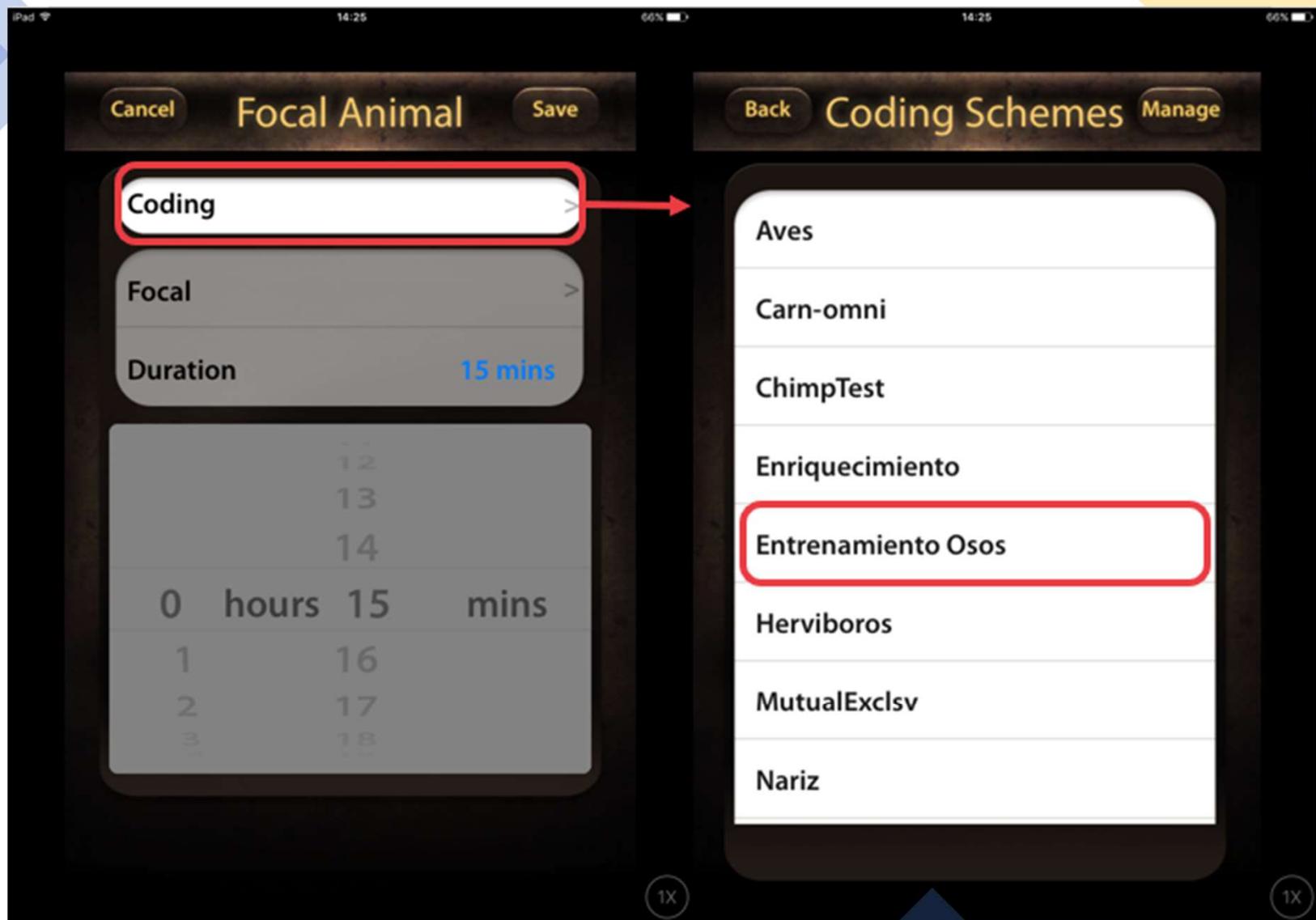


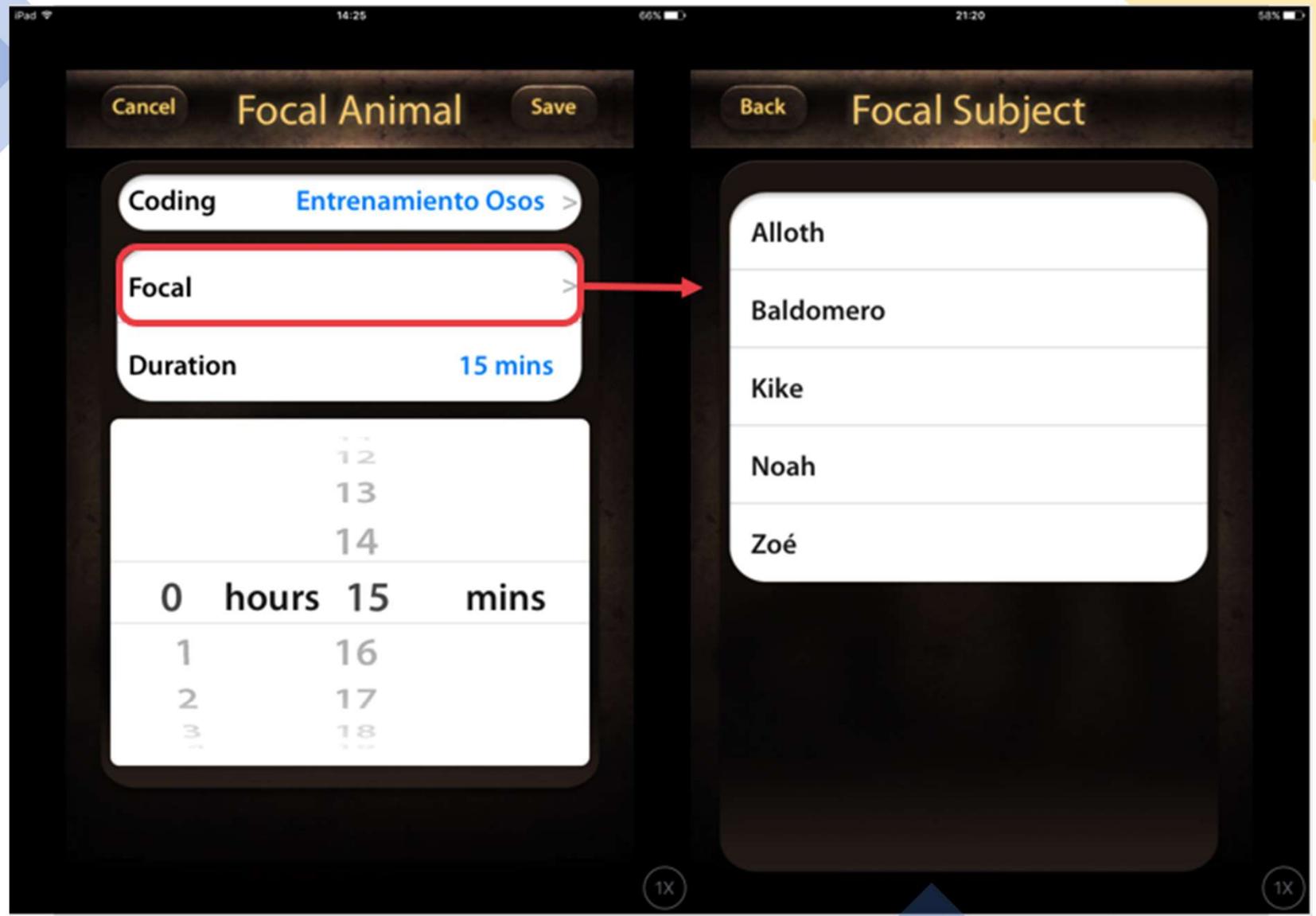


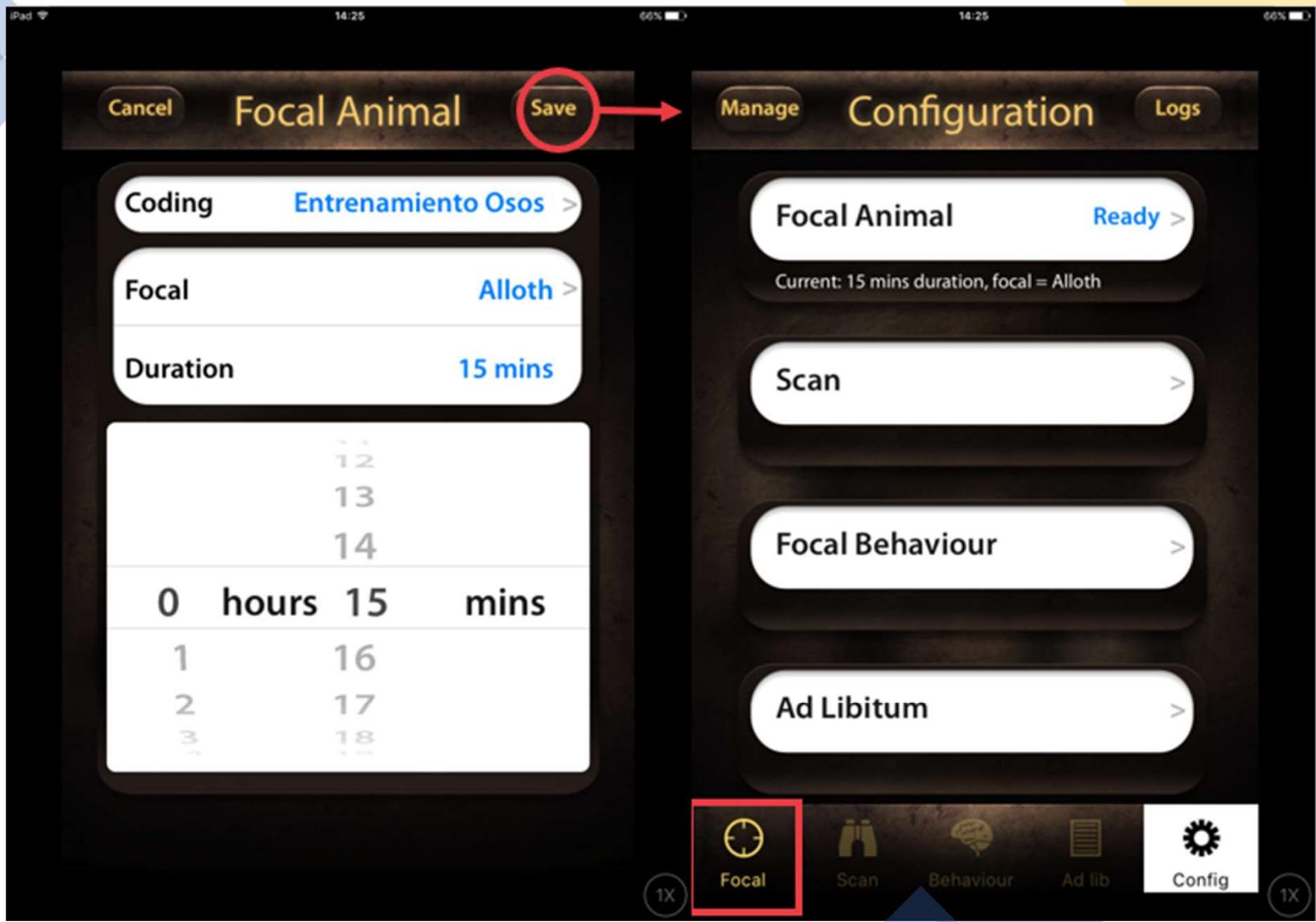






















Configuration

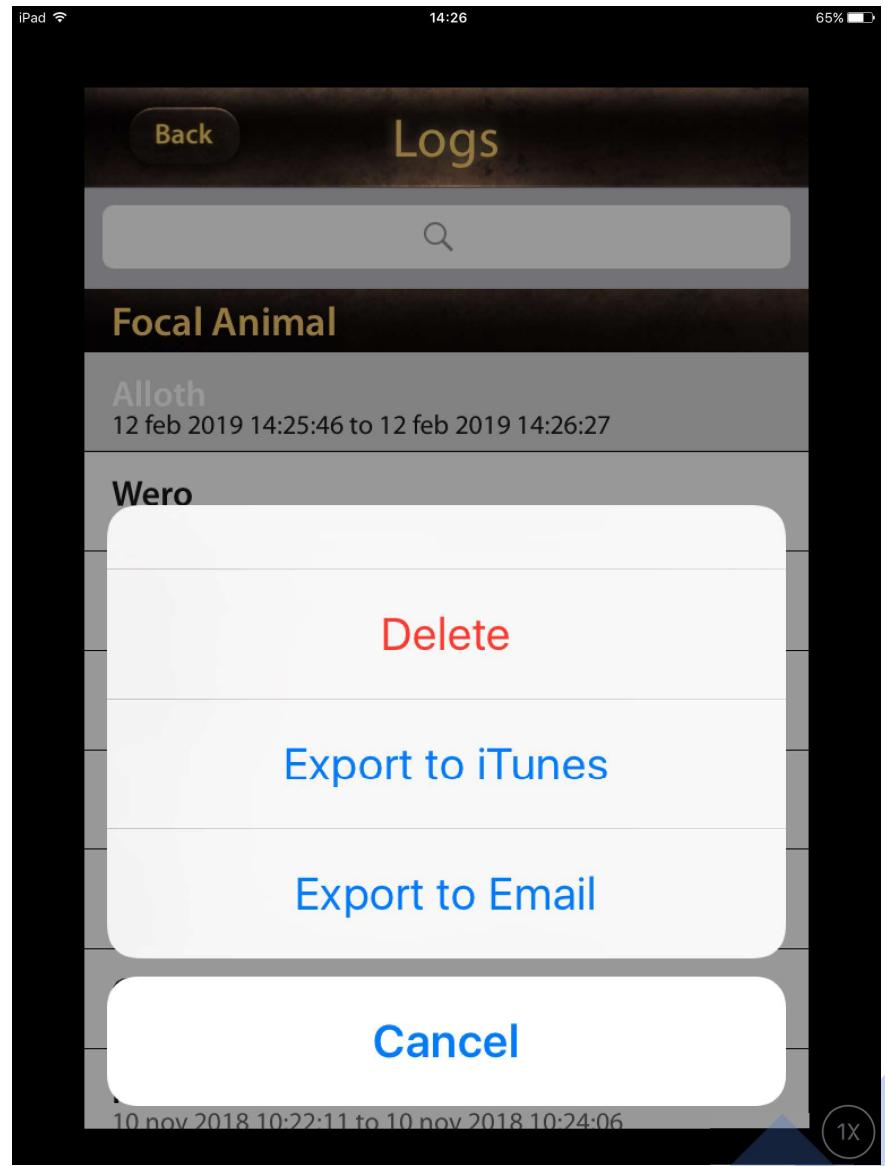
- Focal Animal >
- Scan >
- Focal Behaviour >
- Ad Libitum >

Logs

Logs

Focal Animal	Date Range
Alloth	12 feb 2019 14:25:46 to 12 feb 2019 14:26:27
Wero	13 nov 2018 17:31:37 to 13 nov 2018 17:37:36
Cristina	11 nov 2018 10:58:07 to 11 nov 2018 11:00:54
Rebeca	11 nov 2018 10:55:07 to 11 nov 2018 10:57:44
Judo	11 nov 2018 10:52:05 to 11 nov 2018 10:54:36
Wero	11 nov 2018 10:42:13 to 11 nov 2018 10:47:07
Cristina	10 nov 2018 10:25:08 to 10 nov 2018 10:26:49
Rebeca	10 nov 2018 10:22:11 to 10 nov 2018 10:24:06

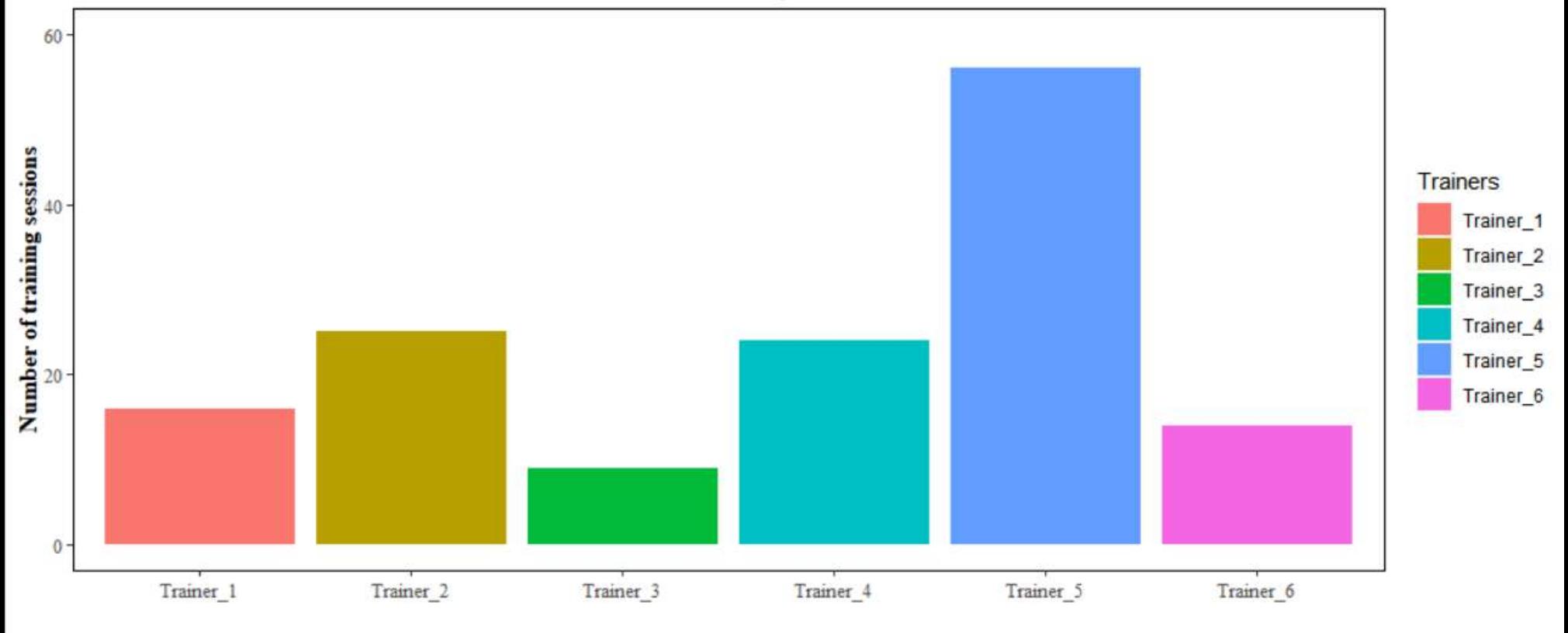
1X



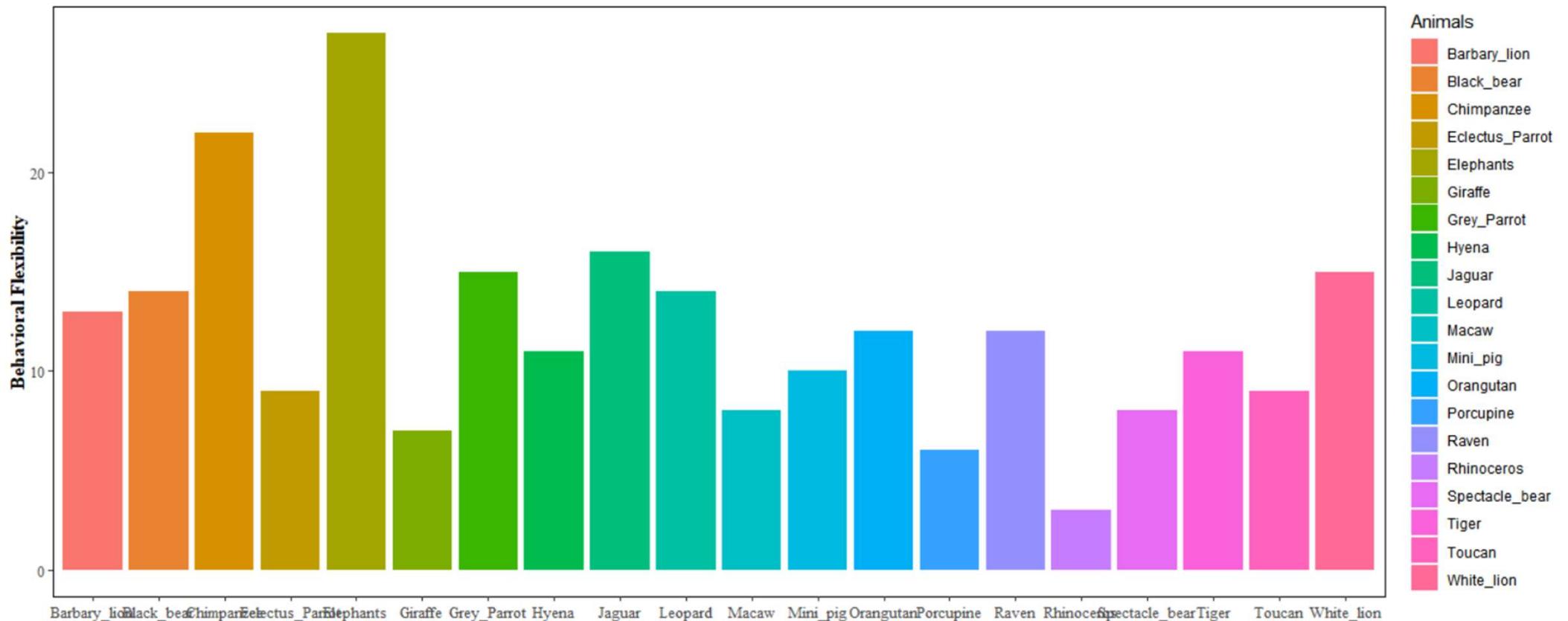


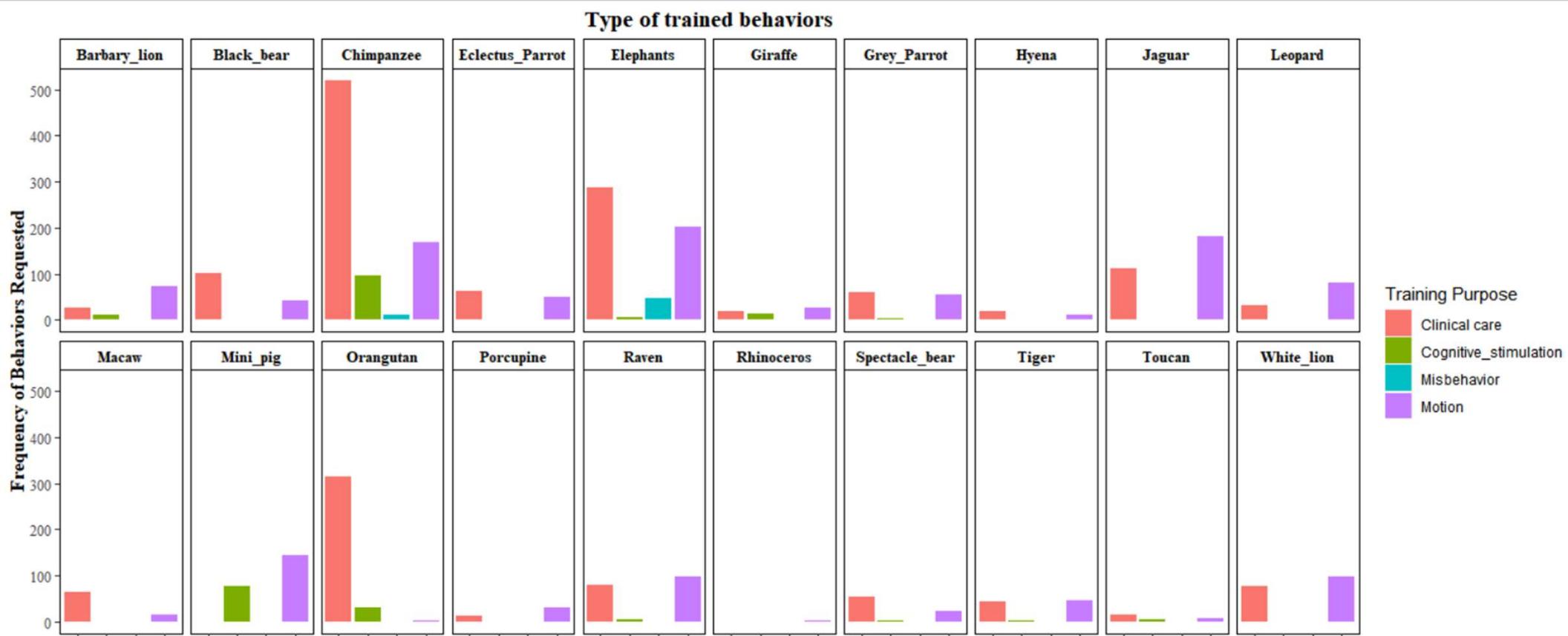
Resultados

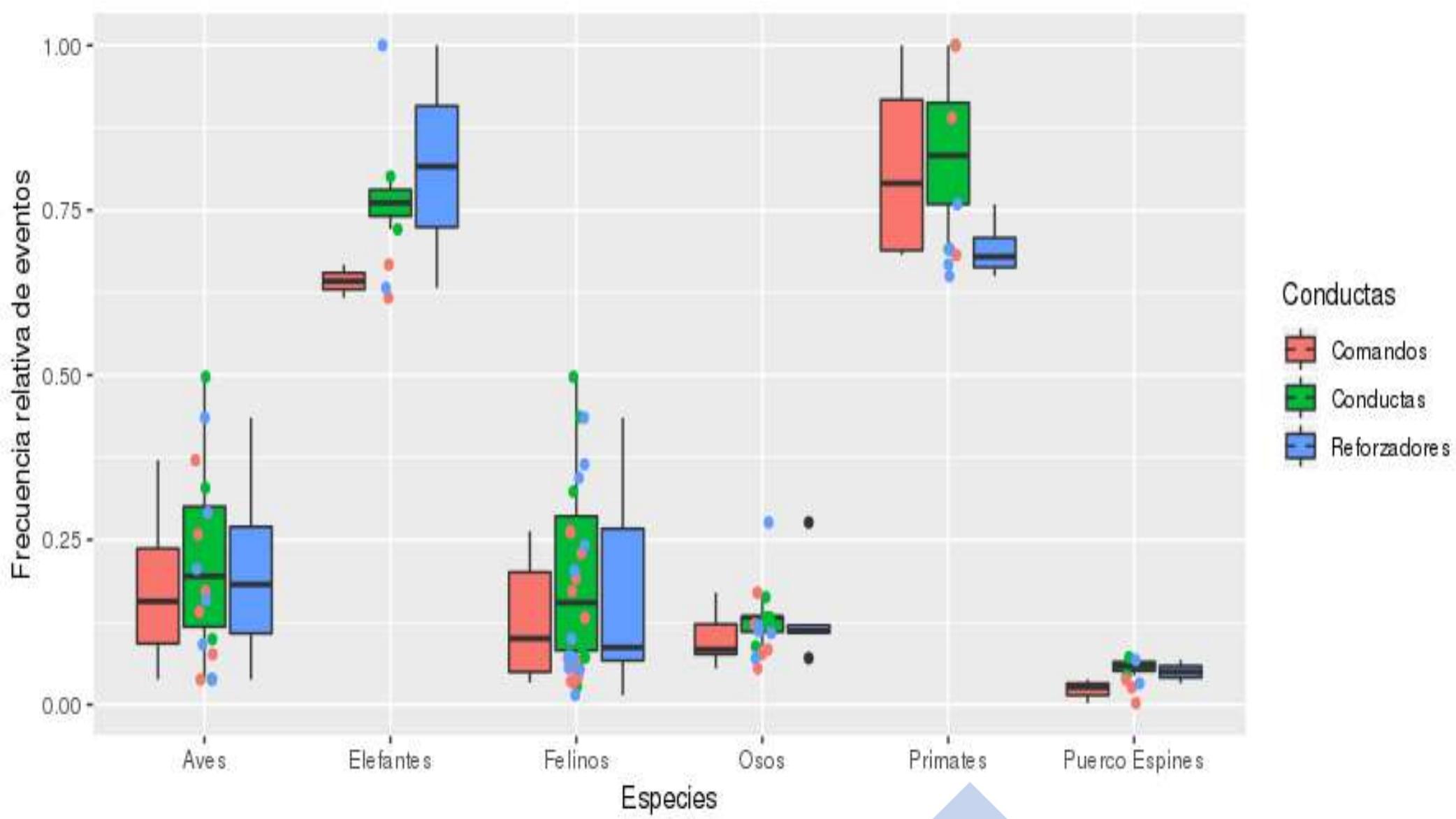
Recorded sessions per trainer

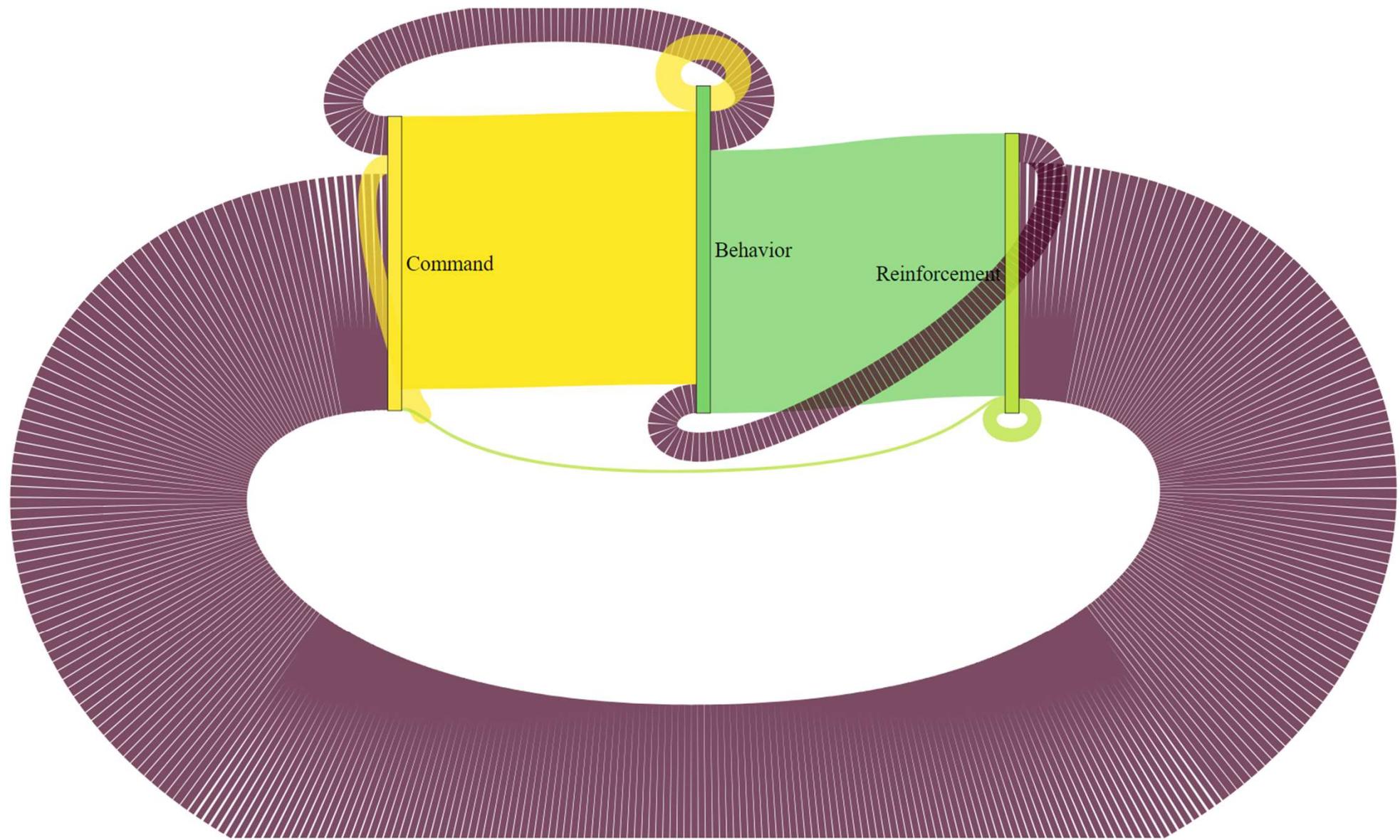


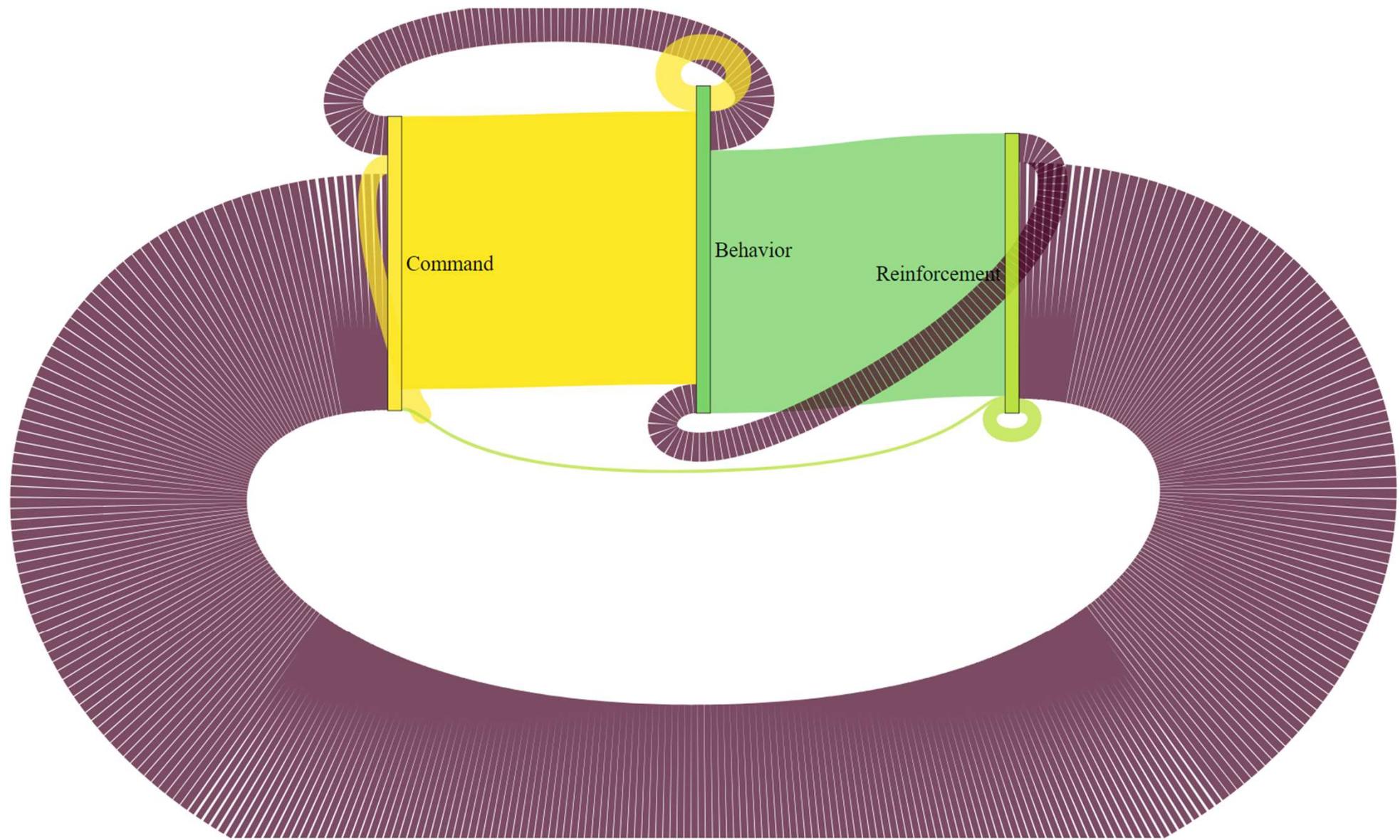
Number of trained behaviors



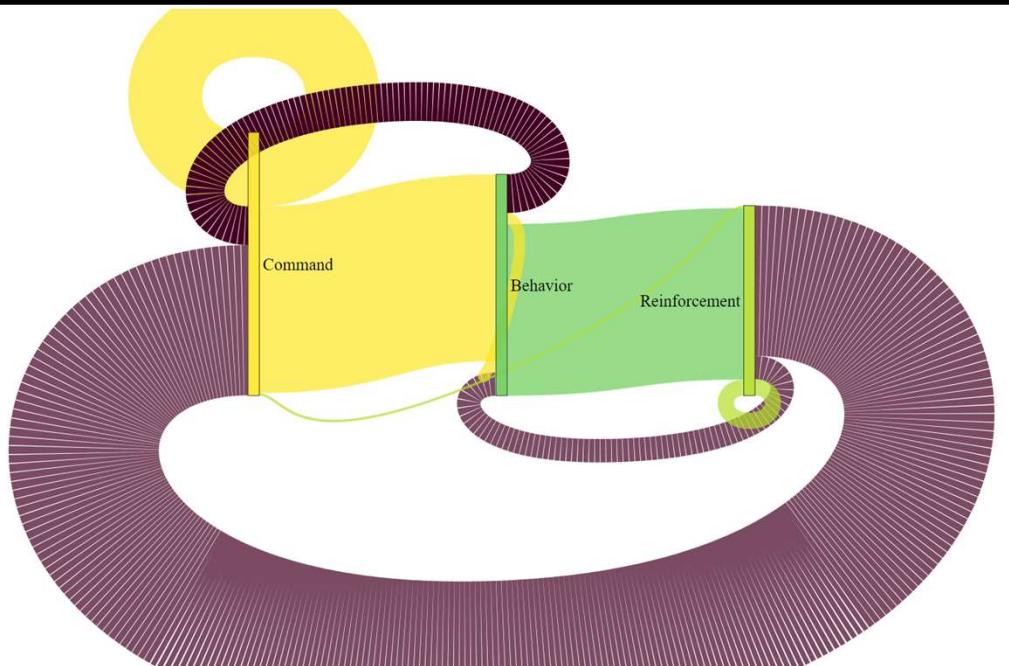




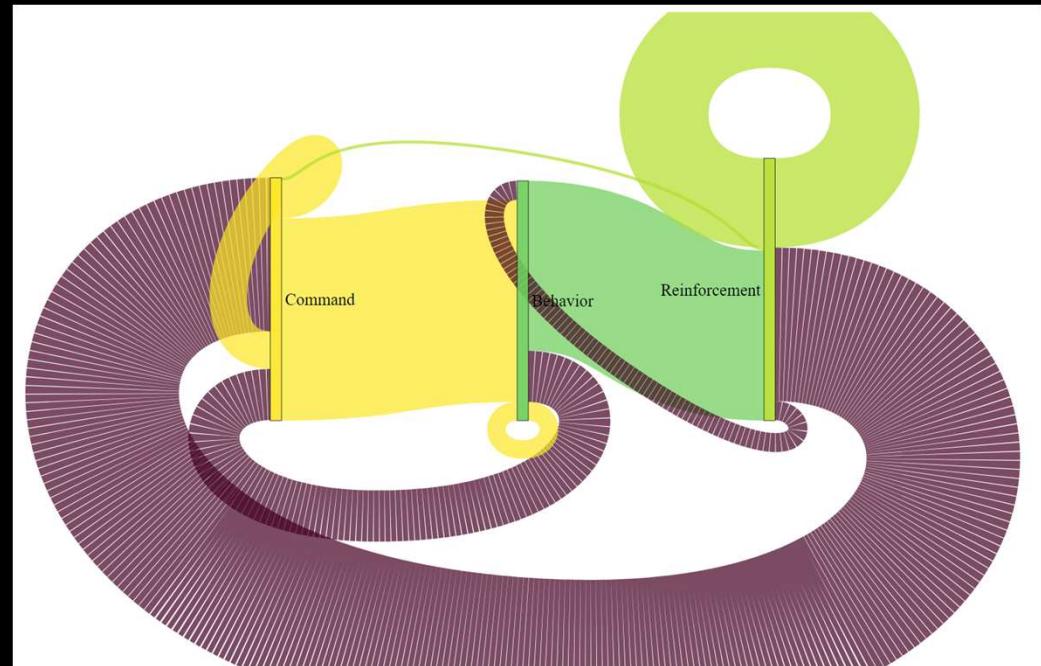


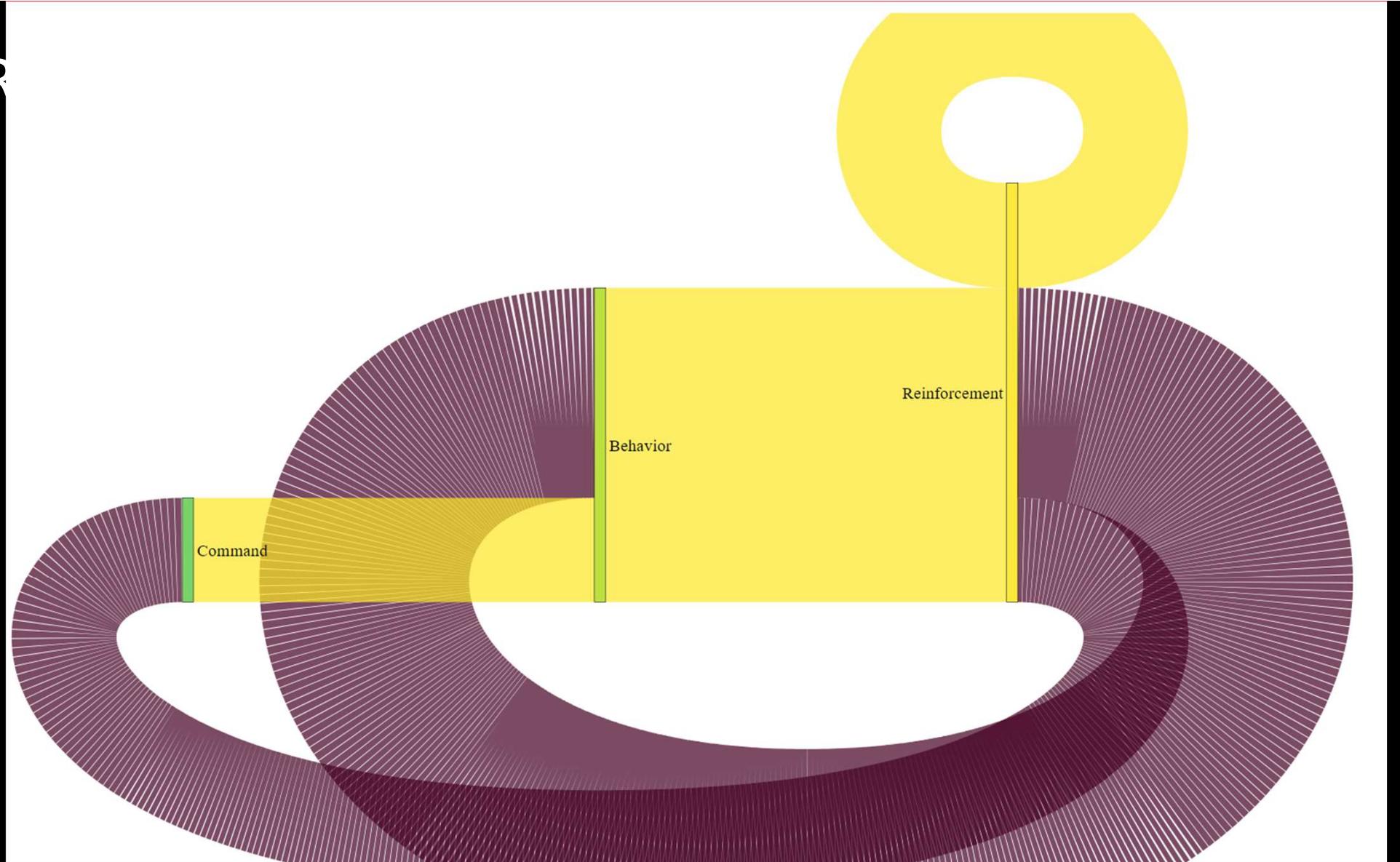


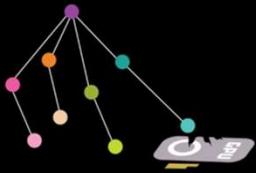
Chimpancés



Elefantes

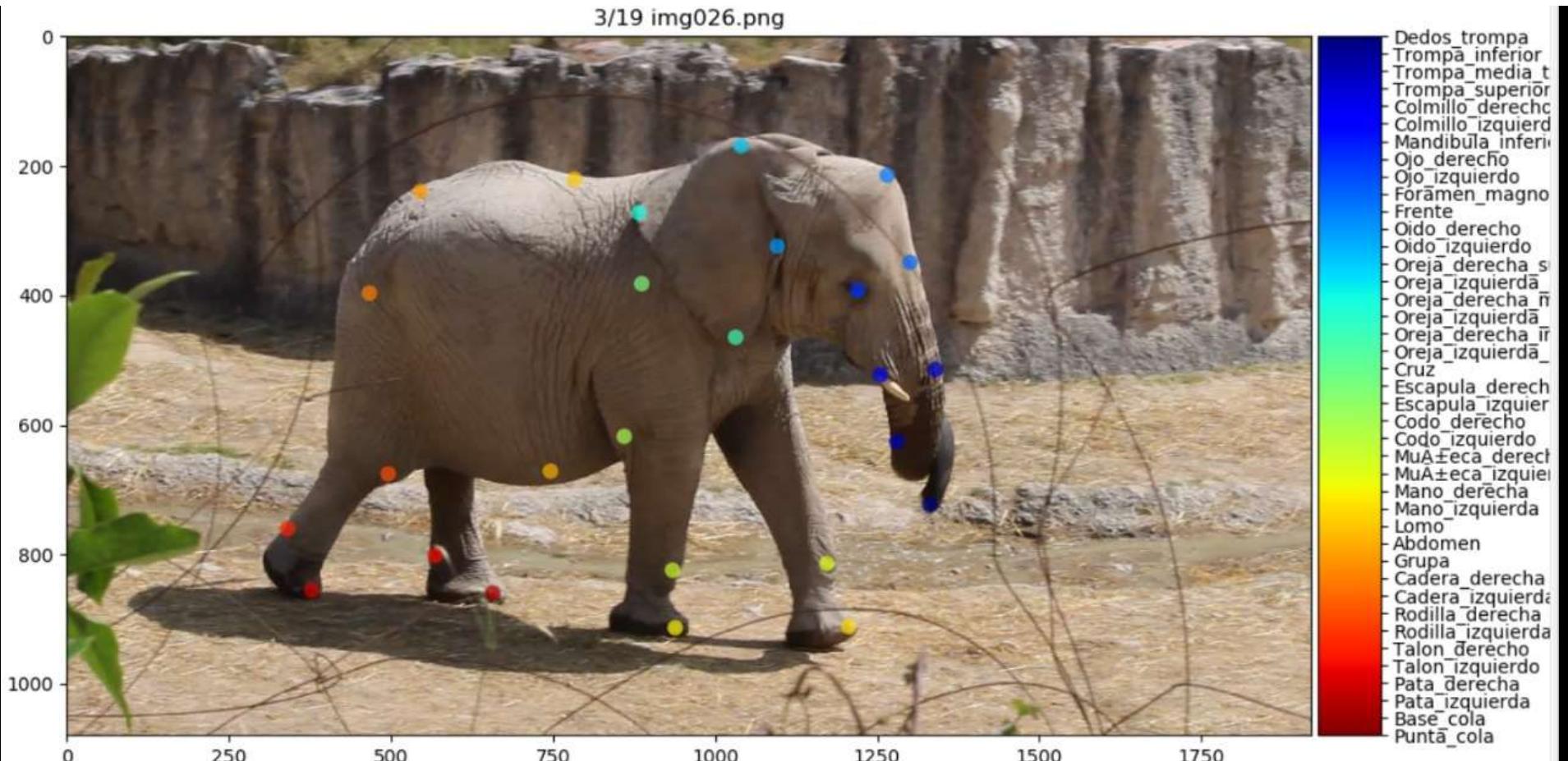






Mathis et al., 2018; Bova et al., 2019; Nath et al., 2019,. Mathis & Mathis, 2020

3/19 img026.png



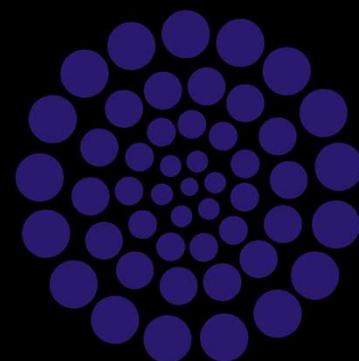
Rodrigo & Martinez (En preparación)



En conclusión

- El registro y análisis del comportamiento nos ayuda a conocer mejor a los animales que se encuentran bajo cuidado humano, respondiendo preguntas acerca de la causa, función, desarrollo y evolución de la conducta.
- Nos ayuda a conocer cuál es estado de salud de nuestros individuos.
- Nos permite implementar técnicas de evaluación de los programas de bienestar animal, incluidos el programa de enriquecimiento y entrenamiento animal.

Agradecimientos



CONACYT





¡Gracias por su atención!



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