



Your Companion in discovery since 1963



ugo basile® 1963  
TRANSFORMING IDEAS  
INTO INSTRUMENTS 2023

**Equipment for Animal Behavioral  
Studies**



Who we are?



**Ugo Basile Srl**, located between Milan and the Swiss border.  
**Since 1963**, serving science

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## The Company, history and positioning

- Founded in 1963:

Strong tradition as a pioneer in laboratory animal behaviour science: «Ugo invented this job!»

- More than 40,000 peer-reviewed citations:

Proved market leadership and high productivity of scientists who buy and use Ugo Basile solutions

- Transforming ideas into instruments:

Ugo Basile' s culture has its foundation in building instruments, as requested by scientists. We keep working closely with scientists, beyond transactions, toward a common goal: science continuous progress



## Main Behavioral Studies

- Pain and Analgesia
- Memory and cognition
- Motor coordination and motor function
- Anxiety and depression



## Studying animal behavior



**Thinking**

**+**



**Sensing**

**=**

**Response**





## Pain is an experience

*The “philosophical” problem of pain detection in animals:  
The absence of verbal communication*



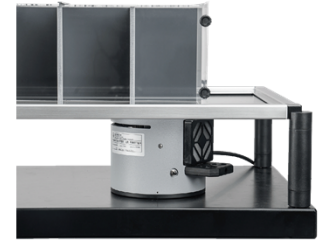
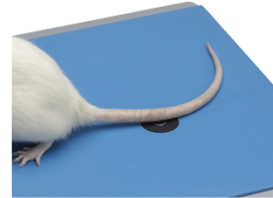
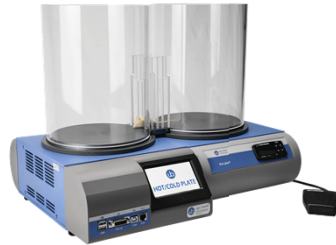
Pain in animals is assessed by measuring **RESPONSES** (reactions) OR **SPONTANEOUS BEHAVIORS** because they cannot self-report about their **EXPERIENCES**



# How to classify Behavioral pain Experiments

## 1. Type of stimulus

- Thermal
- Mechanical
- Chemical



## 2. Induction of stimulus

- Spontaneous
- Evoked



## 3. Inflammation as a separate topic

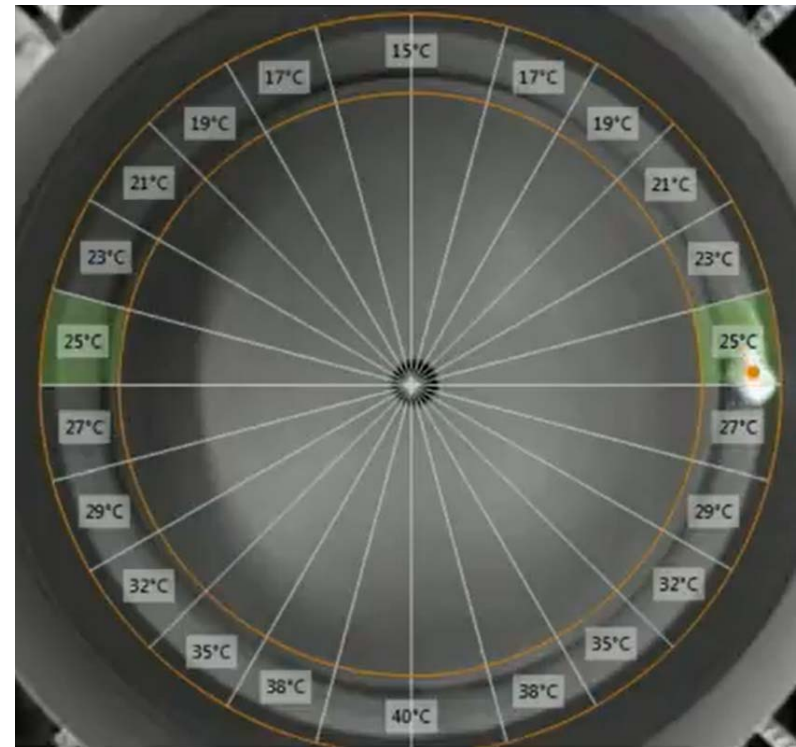




FAU

## THE THERMAL GRADIENT RING

Thermal Preference and Thermal Nociception, fully automated







# TGR OUTCOMES

## Preference temperature (°C)

Treatment	N	Mean	SD (note 1)	Data (note 2)
A	2	30.25	±3.46	27.8 <sup>(1)</sup> , 32.7 <sup>(5)</sup>
B	1	30.80	-	30.8 <sup>(4)</sup>
C	1	28.50	-	28.5 <sup>(2)</sup>
D	1	0.00	-	0.0 <sup>(6)</sup>
E	1	28.70	-	28.7 <sup>(3)</sup>

## % time above [temperature] (%)

Treatment	N	Mean	SD (note 1)	Data (note 2)
A	2	80.70	±27.29	61.4 <sup>(1)</sup> , 100.0 <sup>(5)</sup>
B	1	99.90	-	99.9 <sup>(4)</sup>
C	1	86.40	-	86.4 <sup>(2)</sup>
D	1	0.00	-	0.0 <sup>(6)</sup>
E	1	86.80	-	86.8 <sup>(3)</sup>

## Zone occupancy - Z01 (coldest) (%)

Treatment	N	Mean	SD (note 1)	Data (note 2)
A	2	0.45	±0.64	0.9 <sup>(1)</sup> , 0.0 <sup>(5)</sup>
B	1	0.00	-	0.0 <sup>(4)</sup>
C	1	0.00	-	0.0 <sup>(2)</sup>
D	1	0.00	-	0.0 <sup>(6)</sup>
E	1	0.00	-	0.0 <sup>(3)</sup>

### Notes:

- SD = Standard deviation.
- The numbers in parentheses next to the data values are animal numbers - you can click these to access the animal's details report.

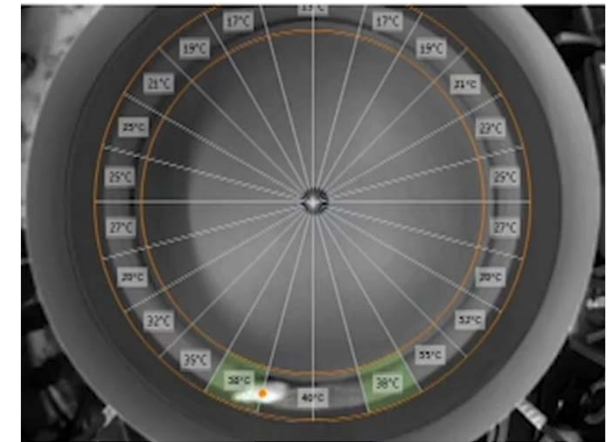
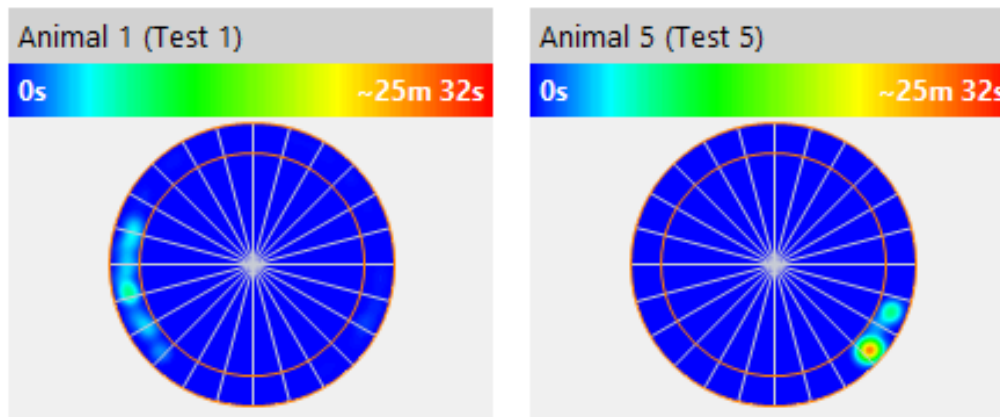


Figure 1. Heat maps of the position of the centre of the animal for tests where Treatment is A.



## Examples of cognition tests in rodents

- **Spatial memory:** Water Maze, Radial Maze, Barnes Maze
- **Spatial working memory:** T-maze, Y-maze, Radial Maze
- **Classical conditioning / association** (passive avoidance, active avoidance) FEAR CONDITIONING
- **Working memory:** Radial maze, operant; within testing session, but not within sessions\*
- **Social recognition** memory: Sociability cage, Agora
- **Novel Object recognition** (recognition memory)
- **Attention, impulsivity:** Operon, Operant Chambers

\*Importance of delay between testing sessions

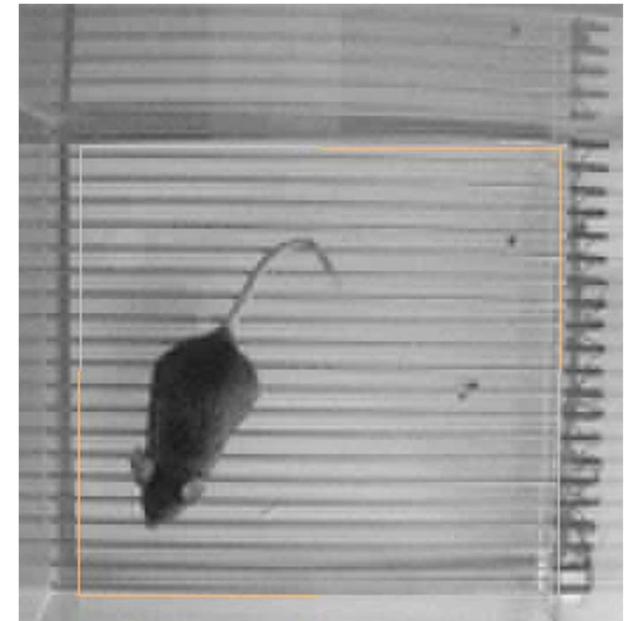


# MEMORY: Fear Conditioning: easy to set-up, easy to use

## The system comes all preinstalled with:

- Camera
- Software
- Example protocol
- IR/VIS illumination
- Sound
- Order the cage you prefer

At this point the Anymaze software will automatically drive your experiment and deliver you the **FREEZING** results you are looking for.





# MEMORY

## Passive Avoidance: step through

- A light chamber and a dark chamber are separated by a doorway.
- Given that illuminated environments are unpleasant to rodents, when placed in the light chamber, they are led into the preferred dark compartment by its innate photophobia.
- During habituation, they're allowed to do so, but in the conditioning phase of the passive avoidance test, the animal will receive a foot shock when he crosses to the dark chamber.
- His innate behavior of seeking a darker environment will thereby become associated with an aversive stimulus.
- When placed again in the light chamber, the animal will avoid entering the dark, shock-associated chamber.
- The latency time to enter the dark compartment is used as a measure of memory.





# 3-Chamber Sociability Test

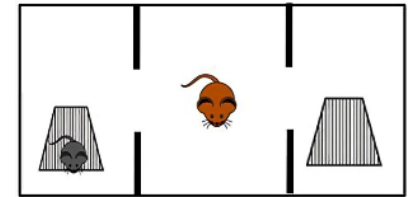
Impairments in social behavior are characteristics of many neurodevelopmental and psychiatric conditions, including autism spectrum disorders (ASD), depression, bipolar disorders, obsessive-compulsive disorders, and schizophrenia.

To assess sociability in animal models, many behavioral tests have been developed. These include tests for assessment of social interaction abnormalities, communication deficits, and repetitive behaviors.

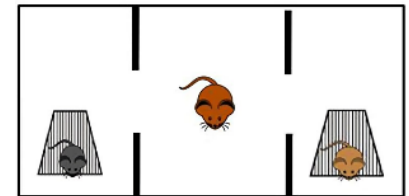
The 3 chamber test measures the "sociability", the preference to spend time with another mouse, as compared to time spent alone in an identical but empty chamber, and "social novelty", the preference to spend time with a previously never-before-met mouse rather than with a familiar mouse.

It can be used to assess the effect of novel drugs on social behavior and the deficits in social interactions in transgenic mice.

It has proven to provide a standard, simple design with a high-throughput approach to compare strains and genotypes, investigate the development of social deficits and to test effects of treatments and other manipulations on proximity and olfactory investigation of stimulus animals.



Social Preference



Social Novelty



# Sociability: 10 things to know

1. Classic 3 chambered social test
2. Especially common in autism disease, parental behavior, sociability, and social memory (social novelty)
3. 3 chambers separated by 2 doors
4. Central chamber for test start
5. 2 chambers with animals in enclosures
6. Enclosures designed with metal bars to maximize interaction
7. Enclosures of different heights
8. Enclosures optimized to avoid jumping on them
9. Different top, cone-shaped or flat
10. Different sizes and colors available on request





# OPERON: for attentional set-shifting and schizophrenia

The Operon system uses **3 different dimensions**:

- Olfactory (10 channels)
- Lights (6 different colors)
- Tactile (6 different textures)

The 10-channel olfactory part is optional, together with the air control system (compressor/aspiration for managing the odors)

The Operon cage is made of 2 identical chambers divided by a sliding door, so that when the animal is running a task in one chamber, the other one already prepares the stimuli for the next task. 2 Pellet dispensers provide rewards depending on the actions in the nose pokes.

Both protocol settings and data are managed by Any-Maze

Look at the videos and at the web page:

<https://youtu.be/Mh6seupNLJo>

<https://youtu.be/gElme9vwdbE>

<https://ugobasile.com/products/categories/behaviour-conditioning-reward/operon-papaleo-scheggia-s-method>

[www.ugobasile.com](http://www.ugobasile.com) [sales@ugobasile.com](mailto:sales@ugobasile.com)





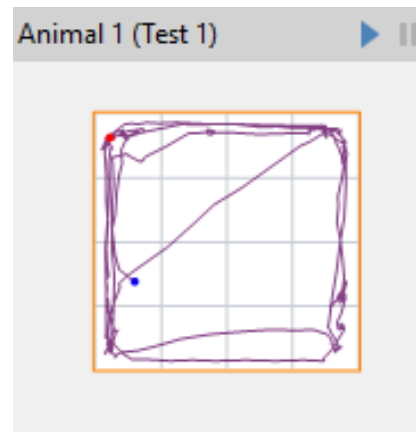
# Anxiety in Rodents

Anxiety is typically induced in rodents by novel environments or open spaces versus more closed ones. In fact, tests paradigms are conflict tests based on a natural tendency of rodents to actively explore novel or more open environments versus their innate fear of being in these open and “unprotected” environments.

These types of tests are typically used for anxiety-related effects of drugs, compounds such as alcohol, and neurological defects in phenotyping (both in forward and reverse genetics).



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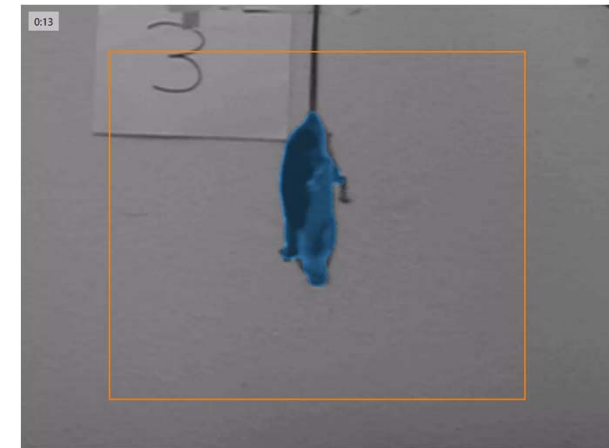






# Tail Suspension Test and Depression

1. A complete system for **Tail Suspension** that can be bought as a combo with the **Porsolt** test (software, camera, hook), also called **Forced Swim Test**
2. Immobility can be scored both manually and automatically
3. The immobility algorithm is specific for immobility and not the one for «freezing»
4. Automated or manual scoring of immobility can be done from above or frontally
5. Species specific are available for rats and mice
6. Multiple animals can be tracked with just 1 camera and 1 software Charts and stats are generated by the videotracking
7. IR cameras can be provided
8. Up to 40 animals can be tracked simultaneously
9. Standard test to assess depression-like behavior
10. Different backgrounds available to maximize video-tracking contrast





# RotaRod: motor coordination and function

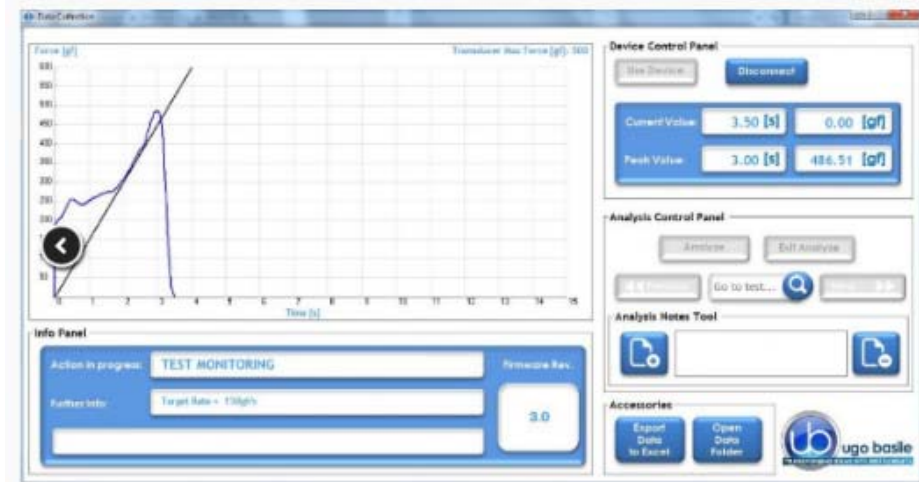
- The “rotarod” technique was originated by N.W. Dunham and T.S. Miya in 1957. It has proved to be of great value in preclinical research in the testing of drugs which affect motor coordination.
- The rotarod test is a performance-based test on a long cylindrical rotating rod with forced motor activity being applied, usually by rodents.. The Rotarod is used in basic research and phenotyping but it also has a strong translational power.
- In fact, due to the concern for impairment in human motor behavior from the use of prescription medications, the rotarod test is frequently used in early stages of drug development to screen out drugs that might later cause subtle impairments, which might not be detected epidemiologically in a human population for a very long time.
- The first original rotarod built after the Dunham-Mya technique.
- Stainless steel trip-boxes that facilitate cleaning. Brand new software is included (Xpad) to organize the experiment on her PC and then upload it into the instrument. The software classifies the data and combines the configuration settings with the test results, which can then be exported in xls. As a stand alone can be easily configured with its touch screen.





# Grip Strength Meter: 10 things to know

1. Automatic detection of grip strength peak
2. Stand-alone (no PC needed; optional)
3. Software included
4. Slope feature (in software and control unit)
5. Battery powered (USB rechargeable)
6. Different bars and grids for different animal types, sizes and number of limbs
7. Broad range transducer
8. No calibration required
9. Autozeroing
10. Export into xls or txt format for xls viewing





# Treadmills

- The treadmill is a popular exercise system used to force-train rodents.
- Ability to vary speeds and inclinations of the runway belt.
- Shock grids are used to motivate the animal to keep running. However, this can potentially result in pain stress influencing exercise training.
- Other methods of motivation such as air-puffs may be used. The treadmill is a simple tool to evaluate the effects of exercise and different intensity training on not just physical health but also cognitive (Hwang et al., 2016) and mental health (Costa et al., 2012).
- Experimenters have the opportunity to observe simultaneous performances of different treatment groups when using a multilane treadmill.
- The use of a treadmill is not limited to physical activity. The apparatus can also be used to investigate physical exhaustion that can often be a symptom of diseases and disorders. Further, assessment of motor and locomotion function post-recovery from injuries can also be done using the treadmill
- Touch screen
- Data saved to USB
- Same instrument for mice (6) or rats (5)
- Different modes of operations (fixed speed, accelerating ramp and customer ramp, pause) and different inclinations.

**Air puff on request. Combo system for mice and rats**



# THANKS FOR THE ATTENTION

## PRESENTER

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