

### INTRODUCTION

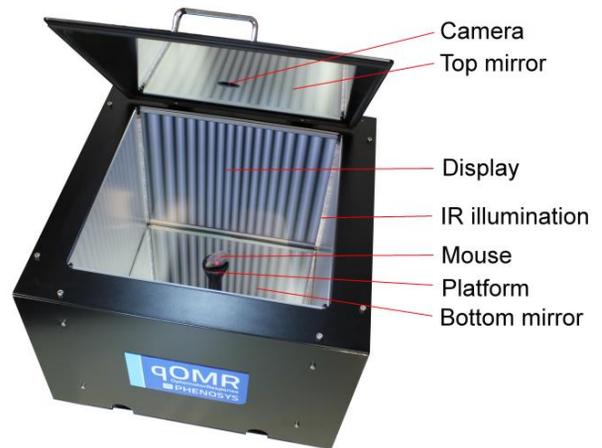
The optomotor response (OMR) is a reflex often used to assess visual abilities. To evoke OMR a rotating cylinder with a striped pattern is presented to an animal on an elevated platform. The resulting head movements are evaluated in relation to the presented stimulus to determine thresholds of visual recognition.

The PhenoSys qOMR (quantitative OMR) is a unique system that automatically measures OMR with minimal experimenter effort. It uses a virtual stimulation cylinder that constantly aligns with the animal's head position. Real-time head tracking delivers quantitative OMR data with fully automatic measurement procedures.

### qOMR System Setup

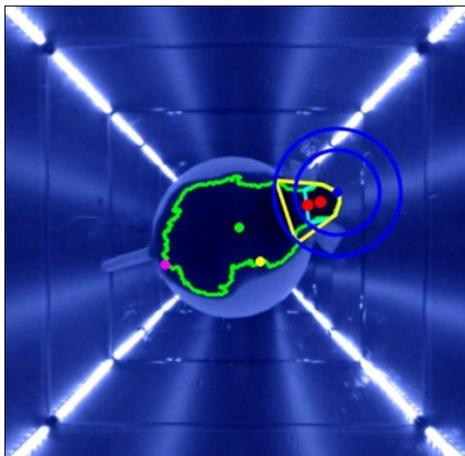
Basic configuration:

- Calibrated 4 screen environment for presenting the virtual stimulation cylinder
- Elevated central platform for placing a freely moving animal
- Top and bottom mirror to create an illusion of infinite depth
- Adjustable infrared illumination
- IR-camera for automatic head tracking undisturbed by the visual stimulus.



### omrStudio Software

#### Video-based real-time head tracking

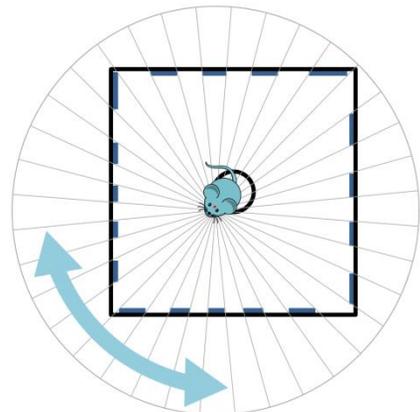


A video-based real-time tracking of the animal position and head angle is employed to :

1. the continuous automated re-centering of the virtual cylinder according to the animal's head position
2. the evaluation of head movement in sync with the stimulation for a quantitative measure of the OMR. This analysis is fully automated.

Batch runs with multiple stimulation protocols are easily defined, saved and reloaded

#### Continuous centering of the rotating virtual cylinder



Easy operation by an intuitive three step procedure:

1. Stimulus design - flexible and easy configuration of experiment (pattern, rotation, repetitions, etc.)
2. Run experiment - place animal on the platform and start the fully automated measurement
3. Data Analysis - analyze multiple data sets, export to various formats or directly generate publication-ready figures

### omrStudio – Three Step Procedure

The image displays three sequential screenshots of the omrStudio software interface. The first screenshot, labeled 'Stimulus esign', shows the 'Pattern' window with a spatial frequency graph and the 'Protocol' window with a speed and turn angle graph. The second screenshot, labeled 'Run Experiment', shows a live video feed of a mouse in a tunnel with tracking overlays and a control panel with various parameters like 'Control Color', 'Green', 'Inverted', and 'Radius'. The third screenshot, labeled 'Data Analysis', shows a line graph with frequency [cycles/°] on the x-axis and a legend for six different mice (mouse 1 to mouse 6).

Stimulus esign

Run Experiment

Data Analysis

### Results

- Typical measurement take a few minutes and consist of a series of different stimuli with intermittent gray-out periods
- 3-5 measurements are required to receive a solid baseline curve e.g., for the visual acuity
- Visual acuity, contrast sensitivity, differences between clockwise and anti-cw stimulation, and scotopic/photopic conditions are possible measurement parameters
- The speed of the stimulus rotation is variable

### Advantages

- Simple, robust, and non invasive test to examine vision in rodents
- Fully automated measurement and analysis: no manual positioning of the stimulus, no specially trained operator required
- Time and cost effective
- Using a natural reflex, qOMR measurements do not require animal training
- Freely behaving animals, no surgery, no fixation
- Flexible, user-friendly experimental design and data analysis
- Operator independent results

### Applications

- Investigation of various aspects of vision in mice and other rodents:
  - Visual acuity
  - Contrast sensitivity
  - Spectral sensitivity
  - Temporal sensitivity
- Characterization or preclinical testing in relevant disease models, for example:
  - Glaucoma
  - Retinal degeneration
  - Diabetes
  - Ageing
- Examination of axonal regeneration

### PhenoSys Collaboration

The PhenoSys qOMR is a *PhenoSys Collaboration* product. These products are brought to market together with the scientists who developed them.

qOMR is a joint product of Dr. Friedrich Kretschmer and PhenoSys.