# Common localizer metadata standard Version: 0.0.1

This document specifies the metadata to be collected with the In2PrimateBrains Common Localizer experiments.   
The metadata specification is an ongoing collaborative endeavor, and we greatly appreciate input from PIs, ESRs, and other participating members to help refine it.   
  
The initial specification is based on the [Brain Imaging Data Structure (BIDS)](https://bids-specification.readthedocs.io/en/stable/), [BIDS Extension Proposal 032 (BEP032)](https://bids.neuroimaging.io/bep032), [BIDS Extension Proposal 020 (BEP020)](https://github.com/bids-standard/bids-specification/pull/1128), [BIDS Extension Proposal 029 (BEP029)](https://github.com/bids-standard/bids-specification/pull/981) and [openMINDS metadata models](https://openminds.ebrains.eu/v2/).  
  
NOTE: We used the following keywords below: "REQUIRED", "RECOMMENDED", and "OPTIONAL". They are to be interpreted as described in [RFC2119](https://www.ietf.org/rfc/rfc2119.txt).

## 1. Dataset Description

* **name** *[REQUIRED]:* Name of the dataset
* **datasetType** *[RECOMMENDED]:* The type(s) of data present in the dataset

Example: raw

Allowed Values: raw, derived

* **license** *[RECOMMENDED]:* The license for the dataset. The use of license name abbreviations is RECOMMENDED for specifying a license. The corresponding full license text MAY be specified in an additional LICENSE file.

Example: CC0

* **authors** *[REQUIRED]:* The List of individuals who contributed to the creation/curation of the dataset.
* **acknowledgements** *[RECOMMENDED]:* Text acknowledging contributions of individuals or institutions beyond those listed in Authors or Funding.
* **howToAcknowledge** *[OPTIONAL]:* Text containing instructions on how researchers using this dataset should acknowledge the original authors. This field can also be used to define a publication that should be cited in publications that use the dataset.
* **funding** *[RECOMMENDED]:* List of sources of funding (grant numbers)
* **ethicsApprovals** *[REQUIRED]:* List of ethics committee approvals of the research protocols and/or protocol identifiers.
* **referencesAndLinks** *[OPTIONAL]:* List of references to publications that contain information on the dataset. A reference may be textual or a URI.
* **datasetDOI** *[RECOMMENDED]:* The Digital Object Identifier of the dataset (not the corresponding paper). DOIs SHOULD be expressed as a valid URI.
* **generatedBy** *[RECOMMENDED]:* List of GeneratedBy objects used to specify the provenance.

Note: GeneratedBy is to be used to specify the provenance in case the dataset is derived

* **name** *[RECOMMENDED]:* Name of the pipeline or process that generated the outputs. Use "Manual" to indicate the derivatives were generated by hand, or adjusted manually after an initial run of an automated pipeline.
* **version** *[RECOMMENDED]:* Version of the pipeline.
* **description** *[OPTIONAL]:* Plain-text description of the pipeline or process that generated the outputs. RECOMMENDED if Name is "Manual"
* **codeURL** *[RECOMMENDED]:* URL where the code used to generate the dataset may be found.
* **container** *[OPTIONAL]:* Used to specify the location and relevant attributes of software container image used to produce the dataset.
* **containerType** *[OPTIONAL]:* Type of the container specified.
* **containerTag** *[OPTIONAL]:* URI of the container image
* **sourceDatasets** *[RECOMMENDED]:* Used to specify the locations and relevant attributes of all source datasets.
* **sourceURL** *[RECOMMENDED]:* Valid URL to the source dataset being described.
* **sourceDOI** *[OPTIONAL]:* Valid DOI to the source dataset being described if available.
* **sourceVersion** *[OPTIONAL]:* Version of the source dataset being described
* **in2PrimateBrainsInfo** *[REQUIRED]:* List of In2PrimateBrains entities that contributed to this dataset.
* **phdProjectNumber** *[REQUIRED]:* PhD project associated with In2PB entity. To be left empty for partner entity.
* **phdProjectTitle** *[RECOMMENDED]:* The proposed title of the PhD project in the grant agreement for the described entity. To be left empty for partner entity.
* **institutionName** *[RECOMMENDED]:* Name of the associated In2PB entity.
* **institutionAbbreviatedName** *[RECOMMENDED]:* Abbreviated name of the In2PB entity.
* **institutionAddress** *[RECOMMENDED]:* Address of the In2PB entity.
* **institutionalDepartmentName** *[RECOMMENDED]:* The department in the institution with which the In2PB entity is associated.
* **principleInvestigators** *[RECOMMENDED]:* List of principle investigators associated with the In2PB entity.
* **pointOfContact** *[RECOMMENDED]:* The name of the person for the point of contact.
* **contactInformation** *[RECOMMENDED]:* The contact information of the PoC - preferably an email id
* **usefulLinks** *[OPTIONAL]:* Optional list of links for adding more information.
* **linkURL** *[OPTIONAL]:* Valid URL of the linked resource.
* **linkDescription** *[OPTIONAL]:* A short description of the linked resource.
* **experimentalInfo** *[OPTIONAL]:* An overview description of the experiment, the data was recorded from.
* **animalModel** *[OPTIONAL]:* List of animal model(s) the recorded data is from.
* **recordingRegion** *[OPTIONAL]:* List of regions the nerual data is recorded from
* **recordingStates** *[OPTIONAL]:* List of recording states of neural data
* **recordedModalities** *[OPTIONAL]:* An overview description of the recording modalities present in the data.
* **neuralActivity** *[OPTIONAL]:* List of recorded modalities of neural data
* **behaviour** *[OPTIONAL]:* List of recorded modalities of behavioral data

## 2. Subject

* **subjectID** *[REQUIRED]:* Unique identifier for the subject.
* **species** *[REQUIRED]:* Binomial species name from NCBI taxonomy (https://www.ncbi.nlm.nih.gov/Taxonomy/taxonomyhome.html/)

Example: Macaca mulatta

* **strain** *[OPTIONAL]:* Literal value indicating the strain of the species.
* **strainRRID** *[OPTIONAL]:* Research resource identifier (RRID) of the strain of the species
* **trivialName** *[OPTIONAL]:* Commonly used species name.

Example: Rhesus macaque

* **abbreviatedID** *[OPTIONAL]:* Abbreviated identifier of the subject, for instance, identifier used in file names.
* **gender** *[REQUIRED]:* Gender of the subject being defined.
* **birthDate** *[RECOMMENDED]:* Date of birth of the participant in YYYY-MM-DDT00:00:00 format (https://en.wikipedia.org/wiki/ISO\_8601#Combined\_date\_and\_time\_representations)
* **age** *[RECOMMENDED]:* Age of the participant at time of begining of recording (first data point recorded) in ISO fromat (https://en.wikipedia.org/wiki/ISO\_8601#Durations)
* **character** *[OPTIONAL]:* Remarks on the general characteristics of the subject.
* **training** *[RECOMMENDED]:* Information on training of the animal.
* **type** *[RECOMMENDED]:* Type of training being described.
* **start** *[RECOMMENDED]:* Date of the start of the training.
* **end** *[RECOMMENDED]:* Date of the end of the training.
* **coach** *[OPTIONAL]:* List of people responsible for training of the subject.
* **comment** *[OPTIONAL]:* Remarks on the training procedure.
* **surgery** *[RECOMMENDED]:* Information on surgeries performed on of the animal.
* **headpostImplantation** *[RECOMMENDED]:* Information on surgery involving headpost implantation.
* **date** *[RECOMMENDED]:* Date of the headpost implantation surgery.
* **weight** *[RECOMMENDED]:* Weight of the subject at the start of surgery in kilograms.
* **surgeon** *[RECOMMENDED]:* List of people responsible for the surgery.
* **duration** *[RECOMMENDED]:* Duration of the surgery in hours.
* **implantmodel** *[RECOMMENDED]:* Model of the implanted headpost.
* **location** *[RECOMMENDED]:* Anatomical location of the implanted headpost.
* **comment** *[RECOMMENDED]:* Remarks on the implantation.
* **arrayImplantation** *[RECOMMENDED]:* Information on surgery involving array implantation.
* **date** *[RECOMMENDED]:* Date of the arrray implantation surgery.
* **weight** *[RECOMMENDED]:* Weight of the subject at the start of surgery in kilograms.
* **surgeon** *[RECOMMENDED]:* List of people responsible for the surgery.
* **duration** *[RECOMMENDED]:* Duration of the surgery in hours.
* **implantmodel** *[RECOMMENDED]:* Model of the implanted array.
* **implantCount** *[RECOMMENDED]:* Number of implanted arrays.
* **hemisphere** *[RECOMMENDED]:* Hemisphere on which the surgery was performed
* **location** *[RECOMMENDED]:* List of anatomical locations of the implanted arrays.
* **comment** *[RECOMMENDED]:* Remarks on the implantation.
* **arraySerialNumber** *[RECOMMENDED]:* Serial number of all the arrays.
* **connectorSerialNumber** *[RECOMMENDED]:* Serial number of the connector.

## 3. Tasks

* **taskType** *[REQUIRED]:* Human-readable abbreviated task type

Example: video

Allowed Values: video, reward

* **taskName** *[REQUIRED]:* Human-readable abbreviated task name

Example: jsallet-a

Allowed Values: monkeyworld-a, monkeyworld-b. Monkeyworld-c, jsallet-a, jsallet-b, reward-a, reward-b

* **configFile** *[RECOMMENDED]:* Relative or absolute path to the configuration file used for specified task.
* **comment** *[OPTIONAL]:* Remarks on the task being described

## 4. Session

* **sessionID** *[REQUIRED]:* A session is defined as the continuous time block between when the first data point is recorded after the subject is brought in and when the subject leaves. The sessionID is a unique identifier which should match the “ses-<label>” used in file naming system.
* **sessionDate** *[OPTIONAL]:* Date and time of start of session YYYY-MM-DDT00:00:00 format (https://en.wikipedia.org/wiki/ISO\_8601#Combined\_date\_and\_time\_representations)
* **sessionWeekDay** *[OPTIONAL]:* Day of the week, the recording was performed.
* **sessionDuration** *[OPTIONAL]:* The total duration of the session (default in seconds)
* **sessionQuality** *[RECOMMENDED]:* A general rating of the quality of the session to simplify data screenings for further analyses.

Allowed Values: excellent, good, ok, bad

* **dataQuality** *[OPTIONAL]:* A general rating of the quality of the primary data signals (in contrast to secondary, e.g. behavioural data)&#10;

Allowed Values: excellent, good, ok, bad

* **taskType** *[OPTIONAL]:* Reference to the taskType performed. This should match one of the defined values in tasks.tsv file.
* **taskName** *[OPTIONAL]:* Reference to the taskName performed. This should match one of the defined values in tasks.tsv file.
* **comment** *[OPTIONAL]:* Comment by the experimenter.
* **totalTrialCount** *[OPTIONAL]:* Total number of trials within a session
* **trials** *[RECOMMENDED]:* Information on individual trials
* **trialID** *[RECOMMENDED]:* Unique identifier associated with each trial
* **trialTimeStamp** *[RECOMMENDED]:* Timestamp associated with the start of the trial
* **trialType** *[RECOMMENDED]:* Reference to the trial type, to be described in the task description

## 5. Electrophysiology

* **probe** *[REQUIRED]:* Probes are physical devices used for recording the electrophysiological data. They can be permanently implanted (chronic recordings) or inserted just for the recording (acute recordings).&#10;
* **probeID** *[REQUIRED]:* Unique identifier for each probe that is referenced in the dataset
* **probetype** *[REQUIRED]:* Type of probe used – Utah array, laminar, single tetrode, etc.
* **probeHemisphere** *[RECOMMENDED]:* Brain hemisphere where probe was located
* **associatedBrainRegion** *[RECOMMENDED]:* Textual indication of the location of the probe in the brain.
* **associatedBrainRegionID** *[RECOMMENDED]:* Identifier of the associated brain region, reference ontology database - https://www.ebi.ac.uk/ols/ontologies/uberon
* **associatedBrainRegionQualityType** *[RECOMMENDED]:* The method used to identify the associated brain region (estimated|proof) depending on anatomical pictures proofing the location or indirect estimation of the location.&#10;
* **referenceAtlas** *[OPTIONAL]:*  Reference atlas used for associated brain region
* **coordinateSpace** *[OPTIONAL]:* The reference space used for the coordinate definition, could be, ‘anatomical’ , ‘recording chamber’, ‘sample’, ‘other’.&#10;
* **anatomicalAxesOrientation** *[OPTIONAL]:* The anatomical axes used as coordinate system, for instance, AIL would mean X, Y, Z axes are oriented towards anterior, inferior and left, respectively.
* **probeX** *[RECOMMENDED]:* Recorded probe position on x-axis
* **probeY** *[RECOMMENDED]:* Recorded probe position on y-axis
* **probeZ** *[RECOMMENDED]:* Recorded probe position on z-axis
* **probeRoll** *[RECOMMENDED]:* Recorded rotation around the roll axis
* **probePitch** *[RECOMMENDED]:* Recorded rotation around the pitch axis
* **probeYaw** *[RECOMMENDED]:* Recorded rotation around the yaw axis
* **placementPicture** *[RECOMMENDED]:* Relative or absolute path to photograph showing probe placement&#10;
* **probeManufacturer** *[RECOMMENDED]:* Manufacturer of the probe system, eg., ‘opnephys’,’blackrock’, etc
* **probeDeviceSerialNumber** *[OPTIONAL]:* Manufacturer provided serial number of the probe
* **probeDepth** *[OPTIONAL]:* Depth of the probe used
* **probeWidth** *[OPTIONAL]:* Width of the probe used
* **probeHeight** *[OPTIONAL]:* Height of the probe used
* **contact** *[REQUIRED]:* Contacts describe the points of contacts to the tissue used for recording electrophysiological signals.
* **contactID** *[REQUIRED]:* Unique identifier for the contact, to match and be referenced in channel description
* **contactHemisphere** *[REQUIRED]:* Brain hemisphere where the contact was located&#10;
* **contactLocation** *[REQUIRED]:* Textual indication of the location of the contact (e.g. cortical layer 3, ca1, etc)&#10;
* **contactX** *[RECOMMENDED]:* Recorded position along the local x-axis relative to the probe origin and rotation &#10;
* **contactY** *[RECOMMENDED]:* Recorded position along the local y-axis relative to the probe origin and rotation
* **contactZ** *[RECOMMENDED]:* Recorded position along the local z-axis relative to the probe origin and rotation
* **contactImpedance** *[RECOMMENDED]:* Impedance of the contact or pipette (pipette\_resistance). This can be a single value or a list of two values indicating a value range.
* **contactShankID** *[OPTIONAL]:* Identifier to specify which shank of the probe the contact is present.
* **contactShape** *[OPTIONAL]:* Description of the shape of the contact, e.g. square, circle, etc.
* **contactSize** *[OPTIONAL]:* Size of the contact, e.g. non-insulated surface area or length of non-insulated cable.
* **contactMaterial** *[OPTIONAL]:* Material of the contact surface.
* **contactInsulation** *[OPTIONAL]:* Material used for insulation around the contact.
* **channel** *[REQUIRED]:* Channels are virtual sources of recorded signals. These might be of neuronal origin (e.g. online filtered LFP signals) or generated by the recording setup (e.g. synchronization signals, behavioral signals, …).&#10;
* **channelID** *[REQUIRED]:* Identifier for the channel, to be referenced in the data files&#10;
* **channelType** *[REQUIRED]:* Type of the channel, e.g. Neural signal, digital trial events, synchronization pulses, etc&#10;
* **channelContactID** *[REQUIRED]:* N/a for non-contact related signal
* **channelName** *[RECOMMENDED]:* Human readable identifier for non-contact related signal, e.g. Daq internal synchronization signals, behavioral signals, behavioral cues, etc.&#10;
* **channelUnit** *[REQUIRED]:* Physical unit of the value represented in this channel&#10;
* **channelSamplingFrequency** *[REQUIRED]:* Sampling rate of the channel
* **channelSamplingFrequencyUnit** *[REQUIRED]:* Unit of the sampling\_frequency, will usually be hz
* **streamID** *[RECOMMENDED]:* Data stream of the recording the signal
* **channelDescription** *[RECOMMENDED]:* Brief free-text description of the channel, or other information of interest.
* **hardwareFilters** *[REQUIRED]:* List of hardware filters (amplifiers) applied, details to be referenced from recording setup metadata for ephys
* **softwareFIlters** *[REQUIRED]:* List of temporal software filters applied, details to be referenced from recording setup metadata for ephys
* **notchFilters** *[REQUIRED]:* List of notch filters applied, e.g. {“filter type”:[low\_frequency, high\_frequency]
* **channelStatus** *[RECOMMENDED]:* Data quality observed on the channel (good/bad), a small description to be given if bad
* **channelStatusDescription** *[RECOMMENDED]:* Freeform text description of noise or artifact affecting data quality on the channel
* **channelGain** *[REQUIRED]:* Amplification factor applied from signal detection at the contact to the signal stored in the data file
* **channelTimeReference** *[REQUIRED]:* Reference channel used for time alignment of signals
* **channelTimeOffset** *[REQUIRED]:* Time shift between signal of this channel to the reference channel
* **channelReference** *[REQUIRED]:* Contact used as physical reference, e.g. Contact\_id, physical location (subdural, chamber screw)
* **channelGround** *[RECOMMENDED]:* Information on the ground, e.g. Chamber screw, head post, ear clip, etc
* **DataAcquisitionSystem** *[RECOMMENDED]:* Information about the hardware and software of the data acquisition system
* **powerLineFrequency** *[OPTIONAL]:* Frequency (in Hz) of the power line at the setup location&#10;
* **manufacturer** *[OPTIONAL]:* Manufacturer of the ephys system (e.g. "OpenEphys”, “Alphaomega",”Blackrock”)
* **manufacturerModelName** *[OPTIONAL]:* Name of the DAQ System used
* **manufacturerModelVersion** *[OPTIONAL]:* Version of the DAQ System
* **recordingSetup** *[OPTIONAL]:* Custom name of the DAQ system
* **institutionName** *[OPTIONAL]:* The name of the institution where data is recorded
* **institutionAddress** *[OPTIONAL]:* The address of the institution where data is recorded
* **samplingFrequency** *[OPTIONAL]:* Internal (maximum) sampling frequency of the AR recording (e.g. 24000).&#10;
* **deviceSerialNumber** *[OPTIONAL]:* The serial number of the components of the setup, recommended to add serial numbers and versions of ALL components constituting the setup
* **software** *[OPTIONAL]:* Software suite used for data acquisition
* **softwareVersion** *[OPTIONAL]:* Version of the acquisition software
* **creator** *[OPTIONAL]:* Name of the person who set up the system&#10;
* **maintainer** *[OPTIONAL]:* Name of the person who maintains the system

## 6. Behavioural

* **eyeTracking** *[REQUIRED]:* Metadata describing the eye tracking recordings
* **samplingFrequency** *[REQUIRED]:* Sampling frequency of the eye tracking data in the recording.
* **sampleCoordinateUnit** *[REQUIRED]:* Unit of individual samples. E.g., in pixel or metric (mm, cm) units&#10;
* **sampleCoordinateSystem** *[REQUIRED]:* For classical screen-based eye tracking like in the CL experiments, it will be “gaze-on-screen”, but “eye-in-head” or “gaze-in-world” are also possible coordinate systems (e.g. in VR)&#10;&#10;
* **environmentCoordinates** *[REQUIRED]:* In the case of the classical gaze-on-screen coordinates, this can be for example: [["0,0", "top left"], ["1,1", "bottom right"]]. In VR this could take on, amongst others, spherical coordinates.
* **screenSize** *[REQUIRED]:* Screen size, excluding potential screen borders (for example [47.2, 29.5] for a screen of 47.2-width by 29.5-height cm).
* **screenResolution** *[REQUIRED]:* Screen resolution (default in pixel) (for example [1920, 1200] for a screen of 1920-width by 1080-height pixels).
* **screenDistance** *[REQUIRED]:* Distance between the participant&apos;s eye and the screen.
* **screenRefreshRate** *[RECOMMENDED]:* Refresh rate of the screen (equivalent to frames per second, "FPS", default unit would be Hertz).
* **dataAcquisitionSystem** *[RECOMMENDED]:* Metadata describing the DAQ used for eye tracking recordings
* **institutionName** *[RECOMMENDED]:* The name of the institution in charge of the equipment that produced the eye-tacking data.
* **institutionAddress** *[RECOMMENDED]:* The address of the institution in charge of the equipment that produced the eye-tacking data.
* **manufacturer** *[RECOMMENDED]:* Manufacturer of the eye-tracking system (e.g. "SR-Research", "Tobii", "SMI", “Gazepoint”, “Pupil Labs”, “Custom built”, ... , "Other")
* **manufacturerModelName** *[RECOMMENDED]:* Manufacturer’s designation of the eye-tracker model (e.g. "Eye-link 1000")
* **softwareVersion** *[RECOMMENDED]:* Manufacturer’s designation of the data acquisition software.
* **deviceSerialNumber** *[RECOMMENDED]:* The serial number of the equipment that produced the data. A pseudonym can also be used to prevent the equipment from being identifiable, as long as each pseudonym is unique within the dataset.
* **calibrationInformation** *[RECOMMENDED]:* Metadata describing the calibration used associated with the eye-tracking recordings
* **calibrationType** *[RECOMMENDED]:* Description of the calibration procedure. For example the "H3" for horizontal calibration with 3 positions or "HV9" for horizontal and vertical calibration with 9 positions, or one point calibration.
* **calibrationUnit** *[RECOMMENDED]:* Unit of "calibrationPosition". Must be one of: "pixel", "mm", "cm".
* **calibrationPosition** *[RECOMMENDED]:* Provide a list of X/Y coordinates in the calibrationUnit. For example, using 5 positions calibration presented on an HD screen, it could be [[960,50],[960,540],[960,1030],[50,540],[1870,540]].
* **maximalCalibrationError** *[RECOMMENDED]:* Maximal calibration error (default in visual degrees)
* **averageCalibrationError** *[RECOMMENDED]:* Average calibration error (default in visual degrees)
* **calibrationErrorUnit** *[RECOMMENDED]:* Unit used for calibration error. Default is visual degrees
* **recordedEye** *[RECOMMENDED]:* Specification for which eye was tracked.Must be one of: "left", "right", "both".
* **eyeCameraSettings** *[RECOMMENDED]:* A field to store any settings that influence the resolution and quality of the eye imagery. Autowhitebalance? Changes in sharpness?
* **featureDetectionSettings** *[RECOMMENDED]:* TBD – if needed or not
* **gazeMappingSettings** *[RECOMMENDED]:* TBD – if needed or not
* **rawDataFilters** *[RECOMMENDED]:* Filter settings applied to eye-movement raw data. For example Eyelink trackers typically automatically filter the raw data.
* **screenAOIDefinition** *[RECOMMENDED]:* A description of the shape of the Screen AOIs and what coordinates are used. ["square", ["x\_start", "x\_stop", "y\_start", "y\_stop"]] Other options: "custom"/"circle"/"triangle", [["x", "y"], ["x", "y"], ["x", "y"], and so on.] - Not applicable for CL protocols defined so far.
* **pupilFitMethod** *[RECOMMENDED]:* The method employed for fitting the pupil, for example "centre-of-mass" or "ellipse". If "centre-of-mass" or "ellipse" method is used, it is RECOMMENDED to use these exact labels.
* **startTime** *[RECOMMENDED]:* Eye-tracking timestamp corresponding to the onset (start) of the run.
* **stopTime** *[RECOMMENDED]:* Eye-tracking timestamp corresponding to the offset (stop) of the run.
* **videoRecording** *[REQUIRED]:* Metadata describing the video recording data
* **videoFileName** *[REQUIRED]:* The name of the video file.
* **videoFileFormat** *[REQUIRED]:* The format of the video file, such as, "MP4", "AVI", "MOV", etc.
* **videoDuration** *[RECOMMENDED]:* The duration of the video file (default in seconds)
* **videoFrameRate** *[RECOMMENDED]:* The frame rate of the video file, in frames per second.
* **videoBitrate** *[RECOMMENDED]:* The bit rate of the video file, in bits per second.
* **videoColorSpace** *[RECOMMENDED]:* The color space used in the video file, for instance, "RGB", "YUV", "CMYK", etc.
* **videoResolution** *[RECOMMENDED]:* The resolution of the video file, in pixels and format "widthxheight"
* **videoAspectRatio** *[RECOMMENDED]:* The aspect ratio of the video file, in the format, width:height
* **videoBitDepth** *[OPTIONAL]:* The bit depth of the video file, in bits per pixel.
* **videoSize** *[OPTIONAL]:* The size of the video file, default in bytes.
* **videoSource** *[OPTIONAL]:* The source of the video file, for instance, "Camera [name]", "Screen capture", etc.
* **videoCreationDate** *[OPTIONAL]:* Date of when the video file was created.
* **behaviouralCodes** *[REQUIRED]:* Metadata describing the behavioural codes associated with the experimental data
* **codeNumber** *[REQUIRED]:* The behavioural code number used during the experimental run.
* **codeName** *[REQUIRED]:* The behavioural code name, corresponding to the code number used during the experimental run.
* **codeDescription** *[REQUIRED]:* A short human-readable description of the behavioral code.

## 7. Physiological

* **cardiovascular** *[RECOMMENDED]:* Metadata describing the cardiovascular recordings
* **heartRate** *[RECOMMENDED]:* Measurement for heart rate.
* **heartPulseRhythm** *[RECOMMENDED]:* The rhythm and force of the heart&apos;s contractions, for instance, "regular", "irregular", "weak", "strong", etc.
* **bloodPressur** *[RECOMMENDED]:* Mt for blood pressure, for instance, "millimeters of mercury"
* **cardiacOuput** *[RECOMMENDED]:* MeasuRement cardiac output, for instance in "liters per minute"
* **ecgSamplingRate** *[RECOMMENDED]:* Sampling rate for the ECG in Hz
* **respiratory** *[RECOMMENDED]:* Metadata describing the respiratory recordings
* **respiratoryRate** *[RECOMMENDED]:* Measurement of respiratory rate, for instance in "breaths per minute"
* **tidalVolume** *[RECOMMENDED]:* Measurement of tidal volume, for instance in "milliliters"
* **minuteVentilation** *[RECOMMENDED]:* Measurement of minute ventilation, for instance in "liters per minute"
* **capnographySamplingRate** *[RECOMMENDED]:* Sampling rate used for capnography in Hz
* **temperature** *[RECOMMENDED]:* Metadata describing temperature recordings
* **coreBodyTemp** *[RECOMMENDED]:* Measurement of temperature of the body&apos;s internal organs.
* **skinTemp** *[RECOMMENDED]:* Measurement of temperature of the skin.
* **metabolic** *[RECOMMENDED]:* Metadata describing metabolic recordings
* **oxygenConsumption** *[RECOMMENDED]:* Measurement of oxygen consumption, for instance in "milliliters per minute"
* **carbonDIoxideProduction** *[RECOMMENDED]:* Measurement of carbon dioxide production, for instance in "milliliters per minute"
* **bloodGlucose** *[RECOMMENDED]:* Measurement of blood glucose, for instance in "millimoles per liter"
* **environmentalConditions** *[RECOMMENDED]:* TBD
* **TBD** *[RECOMMENDED]:* TBD
* **sensorInformation** *[RECOMMENDED]:* TBD
* **TBD** *[RECOMMENDED]:* TBD
* **deviceInformation** *[RECOMMENDED]:* TBD
* **TBD** *[RECOMMENDED]:* TBD