

# Dataset-OS

// Metadata

Name	Dataset-OS
Keywords	MR dataset, EEG dataset, Anatomical dataset, Hemodynamic dataset, Reconstructed dataset, Registration dataset, Parameter quantification dataset, Calibration dataset, Floating dataset
Creation date	September 30 <sup>th</sup> , 2008
Has contributor	Farooq Ahmad, Michel Dojat, Bernard Gibaud, Gilles Kassel, Lynda Temal
Used ontology engineering methodology	OntoSpec
Is of type	Domain ontology
Natural language	English
Has ontology language	OntoSpec
Has formality level	Semi-informal
Ressource locator	<a href="http://www.laria.u-picardie.fr/IC/site/IMG/pdf/Dataset-OS.pdf">http://www.laria.u-picardie.fr/IC/site/IMG/pdf/Dataset-OS.pdf</a>
Version	1.0
Number of concepts (classes)	68
Number of relations (properties)	1

//Relations

Can be superimposed with

## Meta-Properties

*Can be superimposed with* is REFLEXIVE, SYMMETRIC and TRANSITIVE.

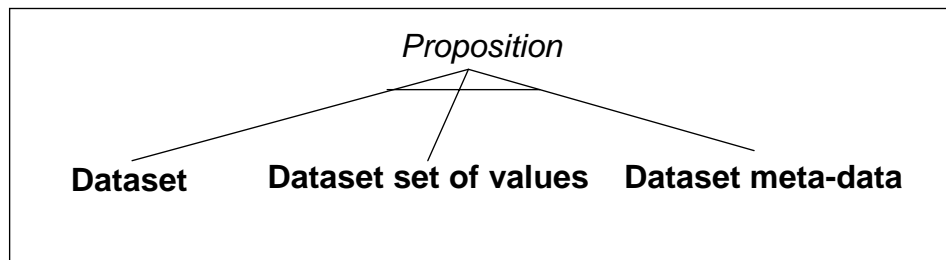
## Properties

[EP/DR & RR] A DATASET *can be superimposed with* a DATASET.

## Comment

[DEF] A DATASET *can be superimposed with* another DATASET implies that the domains of the corresponding mathematical functions coincide. The aim of this relation is to create an equivalence class whose meaning is that any DATASET that is member of the equivalence class may be superimposed with any other member of the same class. Referring to a common dataset instance is just a practical way to manage that, avoiding to calculate the transitive closure of the relationship when we want to know whether two DATASETS instances can be superimposed or not.

//Concepts



Dataset set of values

#### Meta-Properties

DATASET SET OF VALUES is RIGID (+**R**). DATASET SET OF VALUES is DEPENDENT (+**D**).

#### Properties

[EP/SL] A DATASET SET OF VALUES is a PROPOSITION. [EP/ER] Every DATASET SET OF VALUES *is a proper part of* only one DATASET *during* a TIME INTERVAL. [EP/ICL] No DATASET SET OF VALUES is a DATASET. [EP/ICL] No DATASET SET OF VALUES is a DATASET META-DATA.

Dataset meta-data

#### Meta-Properties

DATASET META-DATA is RIGID (+**R**). DATASET META-DATA is DEPENDENT (+**D**).

#### Properties

[EP/SL] A DATASET META-DATA is a PROPOSITION. [EP/ER] Every DATASET META-DATA *is a proper part of* exactly one DATASET *during* a TIME INTERVAL. [EP/ICL] No DATASET META-DATA is a DATASET. [EP/ICL] No DATASET META-DATA is a DATASET SET OF VALUES.

Dataset

#### Meta-Properties

DATASET is RIGID (+**R**). DATASET is DEPENDENT (+**D**). MR DATASET, PET DATASET, CT DATASET, SPECT DATASET, MEG DATASET, and EEG DATASET *is a disjunctive sub-division of* DATASET. ANATOMICAL DATASET, FUNCTIONAL DATASET, METABOLIC DATASET, and HEMODYNAMIC DATASET *is a disjunctive sub-division of* DATASET. RECONSTRUCTED DATASET and NON-RECONSTRUCTED DATASET *is a non-trivial partition of* DATASET.

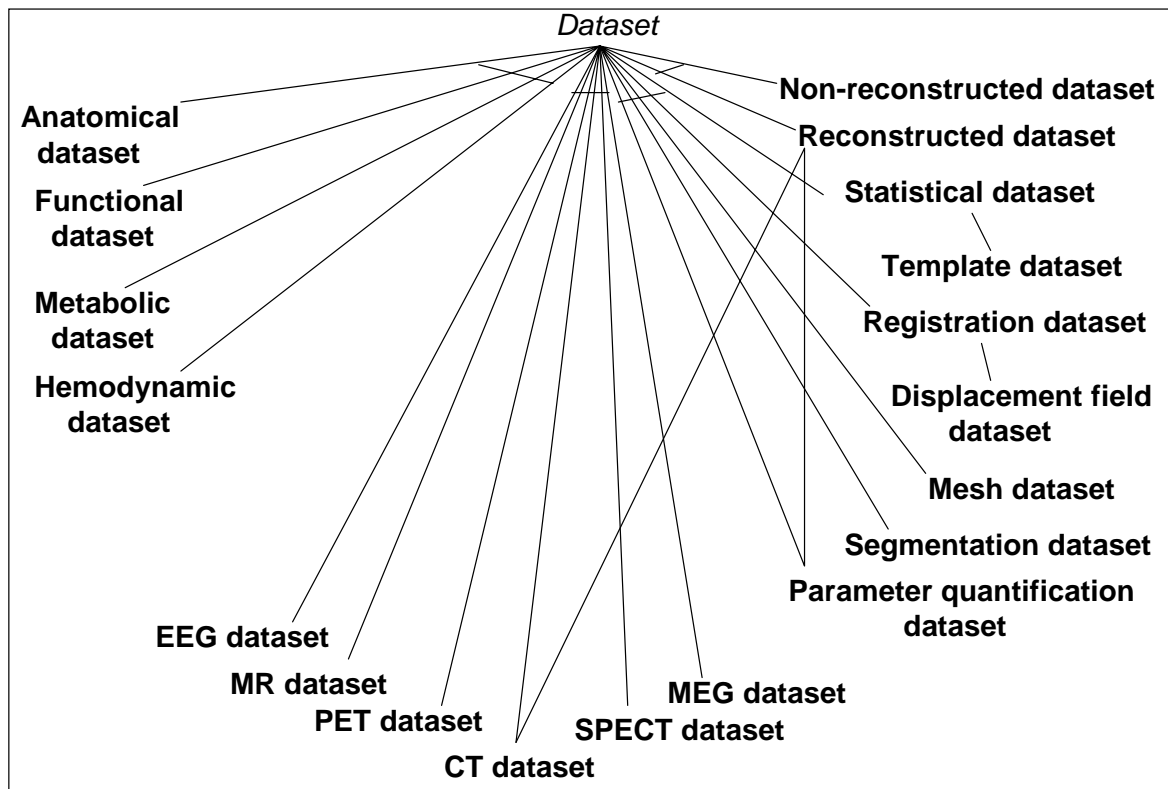
#### Properties

[EP/SL] A DATASET *is* a PROPOSITION. [EP/ER] Every DATASET *has for proper part* exactly one DATASET SET OF VALUES *during* a TIME INTERVAL. [EP/ER] Every DATASET *has for proper part* exactly one DATASET META-DATA *during* a TIME INTERVAL. [EP/ER] Every DATASET *is expressed by* at least one DATASET EXPRESSION *at* a TIME INTERVAL. [EP/ER] Every DATASET *is physically realized by* at least one FILE *at* a TIME INTERVAL. [EP/EER] Every DATASET *refers to* a SUBJECT or an EXPERIMENTAL GROUP OF SUBJECTS. [EP/ICL] No DATASET is a DATASET META-DATA. [EP/ICL] No DATASET is a DATASET SET OF VALUES.

#### Comment

[SA] DATASETS are divided among MR DATASETS, PET DATASETS, CT DATASETS, SPECT DATASETS, MEG DATASETS, and EEG DATASETS according to their modality. We chose to restrict the definition of these modality DATASETS. All the

parameters derived from such modality DATASETS, such as QUANTITATIVE T1 DATASET, etc., are not considered as modality DATASETS. [SA] DATASETS are divided among ANATOMICAL DATASETS, FUNCTIONAL DATASETS, METABOLIC DATASETS, and HEMODYNAMIC DATASETS according to the kind of entity they explore. [SA] DATASETS are divided among REGISTRATION DATASETS, SEGMENTATION DATASETS, TEMPLATE DATASETS, etc., according to the kind of processing they are the result of. [SA] DATASETS are divided among RECONSTRUCTED DATASETS and NON-RECONSTRUCTED DATASETS whether they provide measurements at well-identified locations in 3D space.



## Anatomical dataset

### Meta-Properties

ANATOMICAL DATASET is RIGID (+**R**). ANATOMICAL DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] An ANATOMICAL DATASET is a DATASET which explores a brain anatomical structure.

## Functional dataset

### Meta-Properties

FUNCTIONAL DATASET is RIGID (+**R**). FUNCTIONAL DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A FUNCTIONAL DATASET is a DATASET which explores a brain function.

## Metabolic dataset

### Meta-Properties

METABOLIC DATASET is RIGID (+**R**). METABOLIC DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A METABOLIC DATASET is a DATASET which explores a brain metabolic process.

## Hemodynamic dataset

### Meta-Properties

HEMODYNAMIC DATASET is RIGID (+**R**). HEMODYNAMIC DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A HEMODYNAMIC DATASET is a DATASET which explores a blood flow.

## MR dataset

### Meta-Properties

MR DATASET is RIGID (+**R**). MR DATASET is DEPENDENT (+**D**). VELOCITY ENCODED ANGIO MR DATASET, SPIN TAGGING PERFUSION MR DATASET, TIME OF FLIGHT ANGIO MR DATASET, and CONTRAST AGENT ANGIO MR DATASET *is a disjunctive sub-division of* MR DATASET. DIFFUSION WEIGHTED MR DATASET, PROTON DENSITY WEIGHTED MR DATASET, T1 WEIGHTED MR DATASET, and T2 WEIGHTED MR DATASET *is a disjunctive sub-division of* MR DATASET.

### Properties

[EP/SLD] A MR DATASET is a DATASET which is the result of either a MR DATASET ACQUISITION or a DATASET PROCESSING which processes a MR DATASET as data and keeps the same nature to the DATASET result.

### Comment

[DIV] A MR DATASET is either a RECONSTRUCTED DATASET or a NON-RECONSTRUCTED DATASET. However, the applications considered in the context of the Neurolog project concern essentially RECONSTRUCTED MR DATASETS. So, for simplicity, all the specializations of MR DATASETS currently defined in the ontology are RECONSTRUCTED DATASETS. This choice will be reconsidered later on to take into account both RECONSTRUCTED and NON-RECONSTRUCTED MR DATASETS.

## PET dataset

### Meta-Properties

PET DATASET is RIGID (+**R**). PET DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A PET DATASET is a DATASET which is the result of either a PET DATASET ACQUISITION or a DATASET PROCESSING which processes a PET DATASET as data and keeps the same nature to the DATASET result.

### Comment

[DEF]POSITRON EMISSION TOMOGRAPHY (PET) is a nuclear medicine imaging method similar to computed tomography, except that the image shows the tissue concentration of a positron-emitting radioisotope.

## CT dataset

**Meta-Properties**

CT DATASET is RIGID (+**R**). CT DATASET is DEPENDENT (+**D**).

**Properties**

[EP/SLD] A CT DATASET is a DATASET which is the result of either a CT DATASET ACQUISITION or a DATASET PROCESSING which processes a CT DATASET as data and keeps the same nature to the DATASET result. [CP/SL] Every CT DATASET is a RECONSTRUCTED DATASET. [EP/ICL] No CT DATASET is a PARAMETER QUANTIFICATION DATASET.

**Comment**

[DEF] COMPUTED TOMOGRAPHY (CT) is an imaging method in which a cross-sectional image of the structures in a body plane is reconstructed by a computer program from the x-ray absorption of beams projected through the body in the image plane.

**SPECT dataset****Meta-Properties**

SPECT DATASET is RIGID (+**R**). SPECT DATASET is DEPENDENT (+**D**). NUCLEAR MEDICINE TOMO DATASET and NUCLEAR MEDICINE PROJECTION DATASET *is a disjunctive sub-division of* SPECT DATASET.

**Properties**

[EP/SLD] A SPECT DATASET is a DATASET which is the result of either a SPECT DATASET ACQUISITION or a DATASET PROCESSING which processes a SPECT DATASET as data and keeps the same nature to the DATASET result.

**Comment**

[DEF] SINGLE-PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT) is an imaging method in which gamma photon-emitting radionuclides are administered and then detected by one or more gamma cameras rotated around the patient, using the series of two-dimensional images to recreate a three-dimensional view.

**EEG dataset****Meta-Properties**

EEG DATASET is RIGID (+**R**). EEG DATASET is DEPENDENT (+**D**).

**Properties**

[EP/SLD] An EEG DATASET is a DATASET which is the result of either an EEG DATASET ACQUISITION or a DATASET PROCESSING which processes an EEG DATASET as data and keeps the same nature to the DATASET result.

**Comment**

[DEF] Electro encephalography (EEG) is the measurement of electrical activity produced by the brain as recorded from electrodes placed on the scalp.

**MEG dataset****Meta-Properties**

MEG DATASET is RIGID (+**R**). MEG DATASET is DEPENDENT (+**D**).

**Properties**

[EP/SLD] A MEG DATASET is a DATASET which is the result of either a MEG DATASET ACQUISITION or a DATASET PROCESSING which processes a MEG DATASET as data and keeps the same nature to the DATASET result.

**Comment**

[DEF] Magneto encephalography (MEG) is an imaging technique used to measure the magnetic fields produced by electrical activity in the brain via extremely sensitive devices such as superconducting quantum interference devices (SQUIDs).

## Reconstructed dataset

### Meta-Properties

RECONSTRUCTED DATASET is RIGID (+**R**). RECONSTRUCTED DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A RECONSTRUCTED DATASET is a DATASET which *is a result of* a RECONSTRUCTION *at* a TIME INTERVAL. [CP/EER] Every RECONSTRUCTED DATASET *can be superimposed with* another RECONSTRUCTED DATASET or SEGMENTATION DATASET or STATISTICAL DATASET or PARAMETER QUANTIFICATION DATASET.

### Comment

[DEF] A RECONSTRUCTED DATASET provides a measurement of a quality of the explored object (e.g. brain tissues) at well-identified locations in 3D space, usually organized as a 2D and 3D regular sampling grid. In contrast, a NON RECONSTRUCTED DATASET provides measurements that do not relate to a precise 3D location, such as measurements in Fourier space, or integration along a projection line (e.g. projection image in SPECT or CT).

## Non-reconstructed dataset

### Meta-Properties

NON-RECONSTRUCTED DATASET is RIGID (+**R**). NON-RECONSTRUCTED DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A NON-RECONSTRUCTED DATASET is a DATASET which is not a RECONSTRUCTED DATASET.

### Comment

[DEF] A NON-RECONSTRUCTED DATASET provides measurements that do not relate to a precise 3D location, such as measurements in Fourier space, or integration along a projection line (e.g. projection image in SPECT or CT). In contrast, a RECONSTRUCTED DATASET provides a measurement of a quality of the explored object (e.g. brain tissues) at well-identified locations in 3D space, usually organized as a 2D and 3D regular sampling grid.

## Statistical dataset

### Meta-Properties

STATISTICAL DATASET is RIGID (+**R**). STATISTICAL DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A STATISTICAL DATASET is a DATASET which *is a result of* a DATASET STATISTICAL ANALYSIS *at* a TIME INTERVAL. [CP/EER] Every STATISTICAL DATASET *can be superimposed with* another RECONSTRUCTED DATASET or SEGMENTATION DATASET or STATISTICAL DATASET or PARAMETER QUANTIFICATION DATASET.

## Template dataset

### Meta-Properties

TEMPLATE DATASET is RIGID (+**R**). TEMPLATE DATASET is DEPENDENT (+**D**).

### Properties

[EP/SLD] A TEMPLATE DATASET is a STATISTICAL DATASET which *is a result of*

a DATASETS MEAN CALCULATION *at* a TIME INTERVAL. [CP/SL] Every TEMPLATE DATASET is a STATISTICAL DATASET. [CP/ER] Every TEMPLATE DATASET *refers to* a GROUP OF SUBJECTS.

#### Registration dataset

##### **Meta-Properties**

REGISTRATION DATASET is RIGID (+**R**). REGISTRATION DATASET is DEPENDENT (+**D**).

##### **Properties**

[EP/SLD] A REGISTRATION DATASET is a DATASET which *is a result of* a REGISTRATION *at* a TIME INTERVAL.

#### Displacement field dataset

##### **Meta-Properties**

DISPLACEMENT FIELD DATASET is RIGID (+**R**). DISPLACEMENT FIELD DATASET is DEPENDENT (+**D**).

##### **Properties**

[EP/SLD] A DISPLACEMENT FIELD DATASET is a REGISTRATION DATASET representing a geometric transformation made of displacement vectors.

##### **Comment**

[DEF] “A displacement field is an assignment of displacement vectors for all points in a body that is displaced from one state to another. A displacement vector specifies the position of a point or a particle in reference to an origin or to a previous position.” (Source: Wikipedia).

#### Mesh dataset

##### **Meta-Properties**

MESH DATASET is RIGID (+**R**). MESH DATASET is DEPENDENT (+**D**).

##### **Properties**

[EP/SLD] A MESH DATASET is a DATASET which *is a result of* a MESH GENERATION *at* a TIME INTERVAL.

#### Segmentation dataset

##### **Meta-Properties**

SEGMENTATION DATASET is RIGID (+**R**). SEGMENTATION DATASET is DEPENDENT (+**D**).

##### **Properties**

[EP/SLD] A SEGMENTATION DATASET is a DATASET which *is a result of* a SEGMENTATION *at* a TIME INTERVAL. [CP/EER] Every SEGMENTATION DATASET *can be superimposed with* another RECONSTRUCTED DATASET or SEGMENTATION DATASET or STATISTICAL DATASET or PARAMETER QUANTIFICATION DATASET.

#### Parameter quantification dataset

##### **Meta-Properties**

PARAMETER QUANTIFICATION DATASET is RIGID (+**R**). PARAMETER QUANTIFICATION DATASET is DEPENDENT (+**D**). QUANTITATIVE T1 DATASET, QUANTITATIVE T2 DATASET, QUANTITATIVE T2 STAR DATASET, ABSOLUTE PROTON DENSITY DATASET, FRACTIONAL ANISOTROPY DATASET, RELATIVE

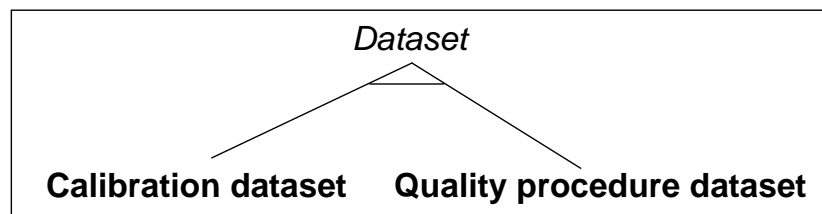
ANISOTROPY DATASET, DIFFUSION TENSOR DATASET, and MEAN DIFFUSIVITY DATASET *is a disjunctive sub-division of* PARAMETER QUANTIFICATION DATASET. BOLD DATASET and FIELD MAP DATASET *is a disjunctive sub-division of* PARAMETER QUANTIFICATION DATASET. REGIONAL CEREBRAL BLOOD FLOW DATASET, REGIONAL CEREBRAL BLOOD VOLUME DATASET, and REGIONAL MEAN TRANSIT TIME DATASET *is a disjunctive sub-division of* PARAMETER QUANTIFICATION DATASET. ABSOLUTE METABOLITE CONCENTRATION DATASET and METABOLITE CONCENTRATION RATIO DATASET *is a disjunctive subdivision of* PARAMETER QUANTIFICATION DATASET.

### Properties

[EP/SLD] A PARAMETER QUANTIFICATION DATASET is a DATASET which *is a result of* a QUANTITATIVE PARAMETER ESTIMATION *at* a TIME INTERVAL. [CP/SL] Every PARAMETER QUANTIFICATION DATASET is a RECONSTRUCTED DATASET. [CP/EER] Every PARAMETER QUANTIFICATION DATASET *can be superimposed with* another RECONSTRUCTED DATASET or SEGMENTATION DATASET or STATISTICAL DATASET or PARAMETER QUANTIFICATION DATASET.

### Comment

[DEF] This class of PARAMETER QUANTIFICATION DATASETS subsumes all the RECONSTRUCTED DATASETS that measure clinically relevant biological quantities of the tissues, such as T1 value, regional cerebral blood volume, fractional anisotropy, etc. They generally result of post-processing of acquired images, based on some estimation model. The values represented in those datasets are considered as measures because they are supposed to be “reproducible when measured again, and also comparable with measurements made by others in others locations” (P.Tofts, Quantitative MRI of the brain, John Wiley, 2004).



### Calibration dataset

#### Meta-Properties

CALIBRATION DATASET is RIGID (+**R**). CALIBRATION DATASET is DEPENDENT (+**D**). FIELD MAP DATASET, VOXEL DISPLACEMENT MAP DATASET and BIAS FIELD DATASET *is a disjunctive sub-division of* CALIBRATION DATASET.

#### Properties

[EP/SLD] A CALIBRATION DATASET is a DATASET which *allows to carry out a* DATASET CALIBRATION. [EP/ICL] No CALIBRATION DATASET is a QUALITY PROCEDURE DATASET.

#### Comment

[DEF] A CALIBRATION DATASET serves for calibration purposes. It represents a model that enables to transform non-calibrated data into calibrated data. For instance, in MR, a Field Map can be acquired for estimating the modification of the field B0 (Static Magnetic Field) or B1 (Radiofrequency Transmit Field) induced by the presence of the subject (i.e. the



magnetic susceptibility of the tissues). From this data (called Magnetic Field Quality datasets) a transformation may be computed in order to compensate for this non-uniformity of the field: this transformation is a CALIBRATION DATASET.

## Quality procedure dataset

### Meta-Properties

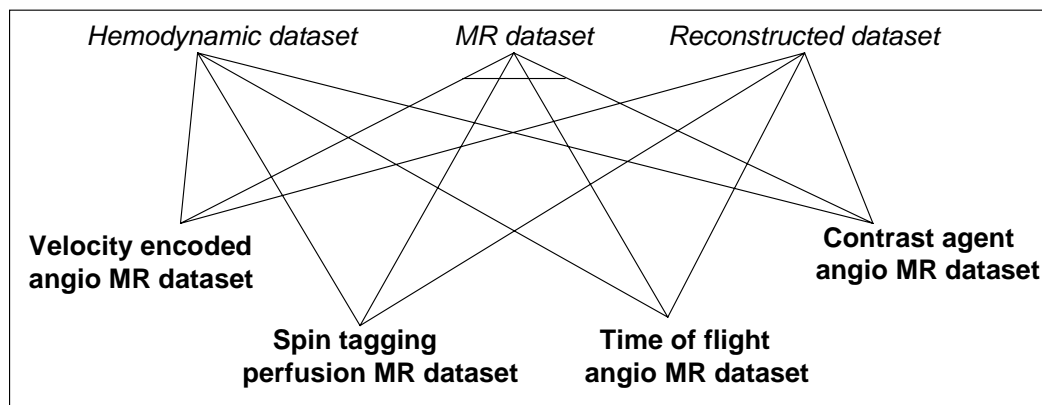
QUALITY PROCEDURE DATASET is RIGID (+**R**). QUALITY PROCEDURE DATASET is DEPENDENT (+**D**).

### Properties

[EP/SL] A QUALITY PROCEDURE DATASET is a DATASET. [EP/ICL] No QUALITY PROCEDURE DATASET is a CALIBRATION DATASET.

### Comment

[DEF] A QUALITY PROCEDURE DATASET is a DATASET which was acquired to assess the quality of the data produced by a piece of imaging equipment. It may also be used to produce a CALIBRATION DATASET. For example, a phantom may be scanned to measure spatial scaling.



## Velocity encoded angio MR dataset

### Meta-properties

VELOCITY ENCODED ANGIO MR DATASET is RIGID (+**R**). VELOCITY ENCODED ANGIO MR DATASET is DEPENDENT (+**D**).

### Properties

[EP/SL] A VELOCITY ENCODED ANGIO MR DATASET is a MR DATASET. [EP/SL] Every VELOCITY ENCODED ANGIO MR DATASET is a HEMODYNAMIC DATASET. [EP/SL] Every VELOCITY ENCODED ANGIO MR DATASET is a RECONSTRUCTED DATASET.

### Comment

[DEF] Spins that are moving in the same direction as a magnetic field gradient develop a phase shift that is proportional to the velocity of the spins. This is the basis of phase-contrast angiography. Phase-contrast pulse sequence is used to encode the velocity of the spins. Stationary spins undergo no net change in phase after the two gradients are applied. Moving spins will experience a different magnitude of the second gradient compared to the first, because of its different spatial position. This results in a net phase shift. This information can be used directly to determine the velocity of the spins. Alternatively, the image can be subtracted from one acquired without the velocity encoding gradients to obtain an angiogram.

## Spin tagging perfusion MR dataset

### Meta-properties

SPIN TAGGING PERFUSION MR DATASET is RIGID (+R). SPIN TAGGING PERFUSION MR DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A SPIN TAGGING PERFUSION MR DATASET is a MR DATASET. [EP/SL] Every SPIN TAGGING PERFUSION MR DATASET is a HEMODYNAMIC DATASET. [EP/SL] Every SPIN TAGGING PERFUSION MR DATASET is a RECONSTRUCTED DATASET.

### Comment

[DEF] Spin tagging is a technique of measurement of blood perfusion, based on magnetically labeled arterial blood water as an endogenous tracer. SPIN TAGGING PERFUSION MR allows to obtain absolute values of perfusion of brain tissue by blood (cerebral blood flow) in ml blood/g tissue/ min.

## Time of flight angio MR dataset

### Meta-properties

TIME OF FLIGHT ANGIO MR DATASET is RIGID (+R). TIME OF FLIGHT ANGIO MR DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A TIME OF FLIGHT ANGIO MR DATASET is a MR DATASET. [EP/SL] Every TIME OF FLIGHT ANGIO MR DATASET is a HEMODYNAMIC DATASET. [EP/SL] TIME OF FLIGHT ANGIO MR DATASET is a RECONSTRUCTED DATASET.

### Comment

[DEF] Time-of-flight (TOF) is based on the phenomenon of flow-related enhancement of spins entering into an imaging slice. As a result of being unsaturated, these spins give more signal than surrounding stationary spins. With 2-D TOF, multiple thin imaging slices are acquired with a flow-compensated gradient-echo sequence. These images can be combined by using a technique of reconstruction such as maximum intensity projection (MIP), to obtain a 3-D image of the vessels analogous to conventional angiography. With 3-D TOF, a volume of images is obtained simultaneously by phase-encoding in the slice-select direction.

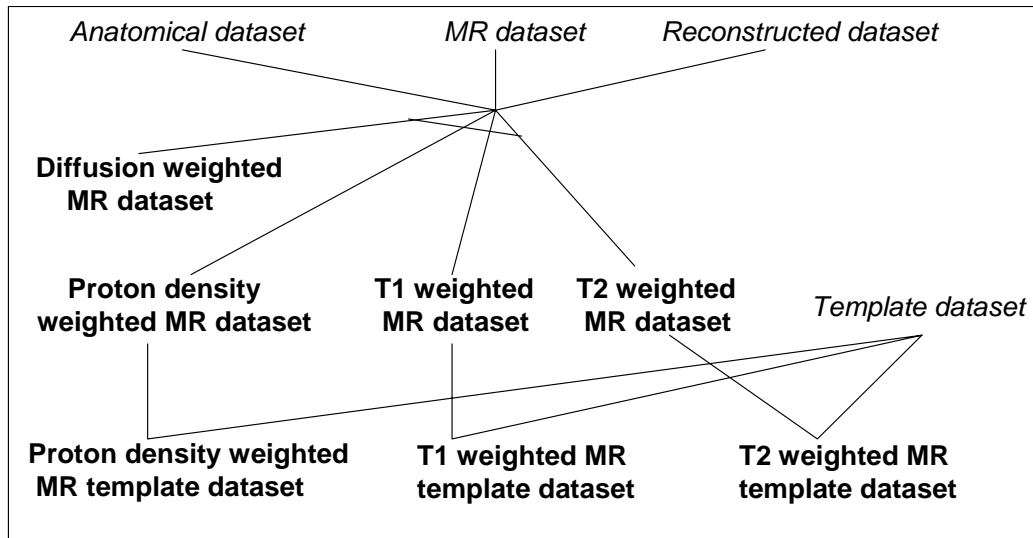
## Contrast agent angio MR dataset

### Meta-properties

CONTRAST AGENT ANGIO MR DATASET is RIGID (+R). CONTRAST AGENT ANGIO MR DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A CONTRAST AGENT ANGIO MR DATASET *is a* MR DATASET. [EP/SL] Every CONTRAST AGENT ANGIO MR DATASET is a HEMODYNAMIC DATASET. [EP/SL] Every CONTRAST AGENT ANGIO MR DATASET is a RECONSTRUCTED DATASET.



## T2 weighted MR dataset

### Meta-properties

T2 WEIGHTED MR DATASET is RIGID (+R). T2 WEIGHTED MR DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A T2 WEIGHTED MR DATASET is a MR DATASET. [EP/SL] Every T2 WEIGHTED MR DATASET is an ANATOMICAL DATASET. [EP/SL] Every T2 WEIGHTED MR DATASET is a RECONSTRUCTED DATASET.

## T2 weighted template dataset

### Meta-properties

T2 WEIGHTED MR TEMPLATE DATASET is RIGID (+R). T2 WEIGHTED MR TEMPLATE DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A T2 WEIGHTED MR TEMPLATE DATASET is a T2 WEIGHTED MR DATASET which is a TEMPLATE DATASET.

## Proton density weighted MR dataset

### Meta-properties

PROTON DENSITY WEIGHTED MR DATASET is RIGID (+R). PROTON DENSITY WEIGHTED MR DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A PROTON DENSITY WEIGHTED MR DATASET is a MR DATASET. [EP/SL] Every PROTON DENSITY WEIGHTED MR DATASET is an ANATOMICAL DATASET. [EP/SL] Every PROTON DENSITY WEIGHTED MR DATASET is a RECONSTRUCTED DATASET.

### Comment

[DEF] All images have intensity proportional to proton density. Images with very little T1 or T2 weighting are called 'PD-weighted'.

## Proton density weighted MR template dataset

### Meta-properties

PROTON DENSITY WEIGHTED MR TEMPLATE DATASET is RIGID (+R).

PROTON DENSITY WEIGHTED MR TEMPLATE DATASET is DEPENDENT (+D).

**Properties**

[EP/SLD] A PROTON DENSITY WEIGHTED MR TEMPLATE DATASET is a PROTON DENSITY WEIGHTED MR DATASET which is a TEMPLATE DATASET.

T1 weighted MR dataset

**Meta-properties**

T1 WEIGHTED MR DATASET is RIGID (+R). T1 WEIGHTED MR DATASET is DEPENDENT (+D).

**Properties**

[EP/SL] A T1 WEIGHTED MR DATASET is a MR DATASET. [EP/SL] Every T1 WEIGHTED MR DATASET is an ANATOMICAL DATASET. [EP/SL] Every T1 WEIGHTED MR DATASET is a RECONSTRUCTED DATASET.

T1 weighted MR template dataset

**Meta-properties**

T1 WEIGHTED MR TEMPLATE DATASET is RIGID (+R). T1 WEIGHTED MR TEMPLATE DATASET is DEPENDENT (+D).

**Properties**

[EP/SLD] A T1 WEIGHTED MR TEMPLATE DATASET is a T1 WEIGHTED MR DATASET which is a TEMPLATE DATASET.

Diffusion weighted MR dataset

**Meta-properties**

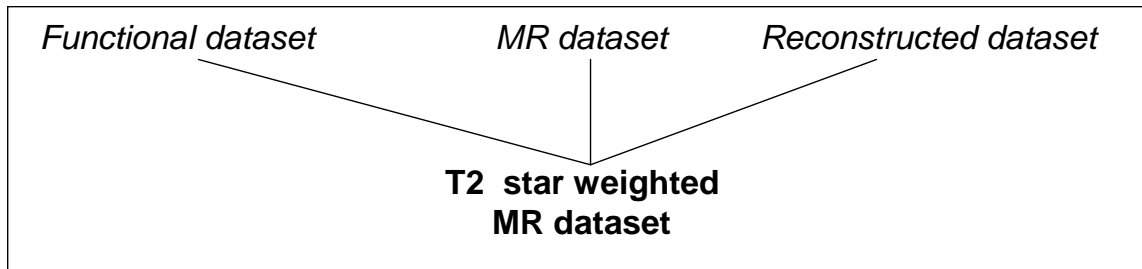
DIFFUSION WEIGHTED MR DATASET is RIGID (+R). DIFFUSION WEIGHTED MR DATASET is DEPENDENT (+D).

**Properties**

[EP/SL] A DIFFUSION WEIGHTED MR DATASET is a MR DATASET. [EP/SL] Every DIFFUSION WEIGHTED MR DATASET is an ANATOMICAL DATASET. [EP/SL] Every DIFFUSION WEIGHTED MR DATASET is a RECONSTRUCTED DATASET.

**Comment**

[DEF] The Stejskal-Tanner imaging sequence is used to exploit diffusion of water molecules. Tissues with highly mobile water, such as cerebrospinal fluid (CSF) (strong diffusion) appear dark on images acquired in the presence of strong diffusion gradients, reflecting the dephasing of the contributing spins. A diffusion map can be calculated by combining at least two diffusion-weighted images that are differently sensitized to diffusion but remain identical with respect to the other parameters, spin density, T1, T2, TR, and TE. By using, for instance, the image S0 without diffusion weighting ( $b=0$ ) and one diffusion-weighted image ( $b > 0$ ), we can calculate a D value for each pixel. A parametric image containing these data is called a diffusion map or apparent diffusion map (ADC). The latter term emphasizes the fact that the D values obtained with this procedure depend on the experimental conditions (eg, direction of the sensitizing gradient and diffusion time delta).



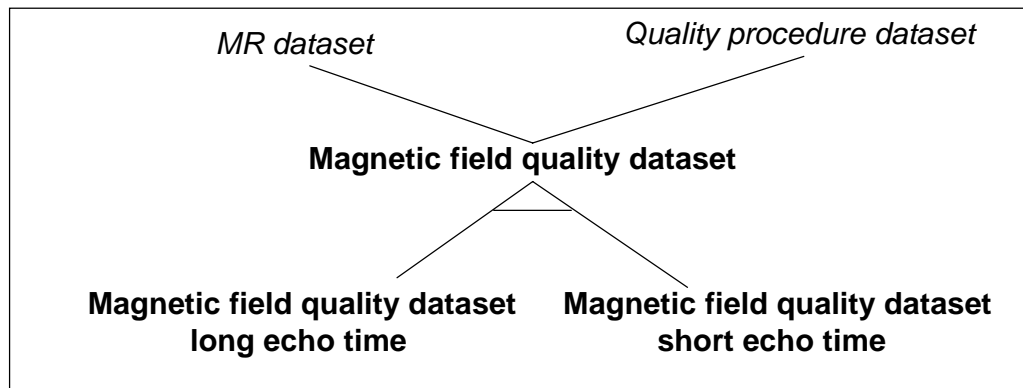
T2 star weighted MR dataset

#### Meta-properties

T2 STAR WEIGHTED MR DATASET is RIGID (+R). T2 STAR WEIGHTED MR DATASET is DEPENDENT (+D).

#### Properties

[EP/SL] A T2 STAR WEIGHTED MR DATASET is a MR DATASET. [EP/SL] Every T2 STAR WEIGHTED MR DATASET is a FUNCTIONAL DATASET. [EP/SL] Every T2 STAR WEIGHTED MR DATASET is a RECONSTRUCTED DATASET.



Magnetic field quality dataset

#### Meta-properties

MAGNETIC FIELD QUALITY DATASET is RIGID (+R). MAGNETIC FIELD QUALITY DATASET is DEPENDENT (+D). MAGNETIC FIELD QUALITY DATASET LONG ECHO TIME and MAGNETIC FIELD QUALITY DATASET SHORT ECHO TIME is a *disjunctive sub-division* of MAGNETIC FIELD QUALITY DATASET.

#### Properties

[EP/SL] A MAGNETIC FIELD QUALITY DATASET is a MR DATASET. [EP/SL] Every MAGNETIC FIELD QUALITY DATASET is a QUALITY PROCEDURE DATASET.

#### Comment

[DEF] A MAGNETIC FIELD QUALITY DATASET is an MR DATASET acquired to measure the non-uniformity of the static magnetic field B0 and linearity of its gradients, or to measure the radiofrequency field inhomogeneities. Such DATASETS are used to create FIELD MAP DATASETS and VOXEL DISPLACEMENT MAPS (which are CALIBRATION DATASETS) that are used to correct the deformation induced by those inhomogeneities.

Magnetic field quality dataset long echo time

#### Meta-properties

MAGNETIC FIELD QUALITY DATASET LONG ECHO TIME is RIGID (+R).  
MAGNETIC FIELD QUALITY DATASET LONG ECHO TIME is DEPENDENT (+D).

**Properties**

[EP/SL] A MAGNETIC FIELD QUALITY DATASET LONG ECHO TIME is a MAGNETIC FIELD QUALITY DATASET.

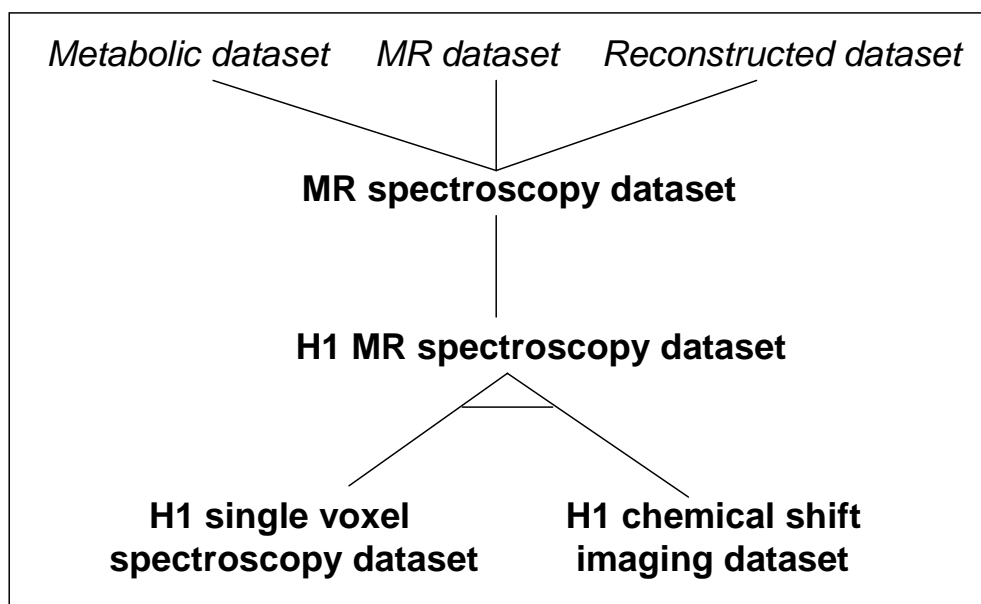
Magnetic field quality dataset short echo time

**Meta-properties**

MAGNETIC FIELD QUALITY DATASET SHORT ECHO TIME is RIGID (+R).  
MAGNETIC FIELD QUALITY DATASET SHORT ECHO TIME is DEPENDENT (+D).

**Properties**

[EP/SL] A MAGNETIC FIELD QUALITY DATASET SHORT ECHO TIME is a MAGNETIC FIELD QUALITY DATASET.



MR spectroscopy dataset

**Meta-properties**

MR SPECTROSCOPY DATASET is RIGID (+R). MR SPECTROSCOPY DATASET is DEPENDENT (+D).

**Properties**

[EP/SL] A MR SPECTROSCOPY DATASET is a MR DATASET. [EP/SL] Every MR SPECTROSCOPY DATASET is a METABOLIC DATASET. [EP/SL] Every MR SPECTROSCOPY DATASET is a RECONSTRUCTED DATASET.

**Comment**

[DEF] MR Spectroscopy (or MRS) allows particular chemical compounds or metabolites (substances taking part in chemical processes in living organisms) to be observed. We should distinguish between SINGLE VOXEL MR Spectroscopy and CHEMICAL SHIFT IMAGING. The first concerns a single (usually cuboidal) voxel, and provides a spectrum. The second is also called Spectroscopic imaging. It provides a coarse-resolution image of the spectra measured at each voxel. Absolute concentrations of the metabolites or concentration ratios of pairs of metabolites (usually referenced to Cr) can be derived from

these spectra, leading to ABSOLUTE METABOLITE CONCENTRATION DATASET and METABOLITE CONCENTRATION RATIO DATASET.

## H1 MR spectroscopy dataset

### Meta-properties

H1 MR SPECTROSCOPY DATASET is RIGID (+R). H1 MR SPECTROSCOPY DATASET is DEPENDENT (+D). H1 SINGLE VOXEL SPECTROSCOPY DATASET and H1 CHEMICAL SHIFT IMAGING DATASET *is a disjunctive sub-division of* H1 MR SPECTROSCOPY DATASET.

### Properties

[EP/SL] A H1 MR SPECTROSCOPY DATASET is a MR SPECTROSCOPY DATASET.

## H1 single voxel spectroscopy dataset

### Meta-properties

H1 SINGLE VOXEL SPECTROSCOPY DATASET is RIGID (+R). H1 SINGLE VOXEL SPECTROSCOPY DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A H1 SINGLE VOXEL SPECTROSCOPY DATASET is an H1 MR SPECTROSCOPY DATASET.

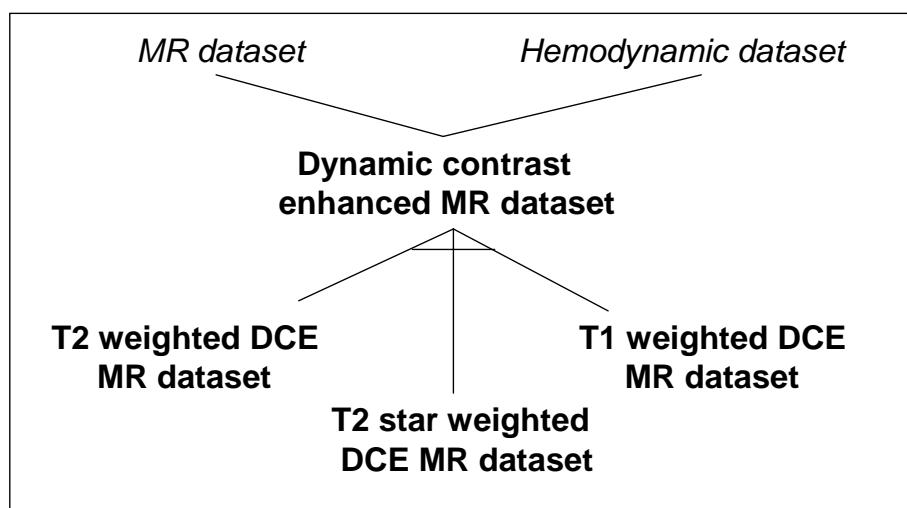
## H1 chemical shift imaging dataset

### Meta-properties

H1 CHEMICAL SHIFT IMAGING DATASET is RIGID (+R). H1 CHEMICAL SHIFT IMAGING DATASET is DEPENDENT (+D).

### Properties

[EP/SL] an H1 CHEMICAL SHIFT IMAGING DATASET is an H1 MR SPECTROSCOPY DATASET.



## Dynamic contrast-enhanced MR dataset

### Meta-properties

DYNAMIC CONTRAST-ENHANCED MR DATASET is RIGID (+R). DYNAMIC CONTRAST-ENHANCED MR DATASET is DEPENDENT (+D). T2 WEIGHTED DCE MR DATASET, T2 STAR WEIGHTED DCE MR DATASET, and T1 WEIGHTED DCE

MR DATASET *is a disjunctive sub-division of* DYNAMIC CONTRAST-ENHANCED MR DATASET.

**Properties**

[EP/SL] A DYNAMIC CONTRAST-ENHANCED MR DATASET is a MR DATASET.

[EP/SL] Every DYNAMIC CONTRAST-ENHANCED MR DATASET is a HEMODYNAMIC DATASET.

**Comment**

[DEF] A DYNAMIC CONTRAST-ENHANCED MR DATASET reflects the dynamics of exogenous extracellular contrast media.

T2 weighted DCE MR dataset

**Meta-properties**

T2 WEIGHTED DCE MR DATASET is RIGID (+R). T2 WEIGHTED DCE MR DATASET is DEPENDENT (+D).

**Properties**

[EP/SL] A T2 WEIGHTED DCE MR DATASET is a DYNAMIC CONTRAST-ENHANCED MR DATASET.

T2 star weighted dataset

**Meta-properties**

T2 STAR WEIGHTED DCE MR DATASET is RIGID (+R). T2 STAR WEIGHTED DCE MR DATASET is DEPENDENT (+D).

**Properties**

[EP/SL] A T2 STAR WEIGHTED DCE MR DATASET is a DYNAMIC CONTRAST-ENHANCED MR DATASET.

**Comment**

[DEF] A T2 and T2 STAR WEIGHTED DCE MR DATASET reflects the T2 and T2 STAR of tissue decrease as the Gd contrast agent bolus passes through the brain. From the changes along time reflecting how the Gd contrast agent bolus passes through the brain, it is possible to estimate the cerebral blood flow (represented in milliliters of blood per gram of tissue per minute) as well as the cerebral blood volume (represented in milliliters of blood per gram of tissue). However, absolute quantification of perfusion is unreliable since the arterial input function is not well characterized and the relaxivity is unknown.

T1 weighted DCE MR dataset

**Meta-properties**

T1 WEIGHTED DCE MR DATASET is RIGID (+R). T1 WEIGHTED DCE MR DATASET is DEPENDENT (+D).

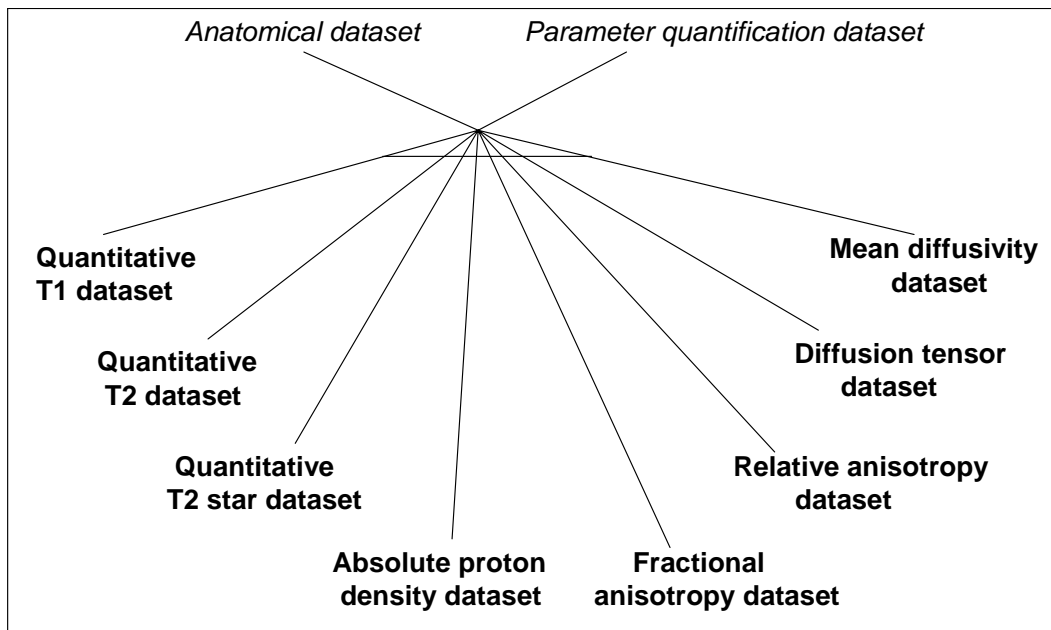
**Properties**

[EP/SL] A T1 WEIGHTED DCE MR DATASET is a DYNAMIC CONTRAST-ENHANCED MR DATASET.

**Comment**

[DEF] A T1 WEIGHTED DCE MR DATASET reflects the dynamics of diffusion of the exogenous contrast media from the blood pool into the extra vascular extracellular space (EES) of the brain at a rate determined by the blood flow to the tissue, the permeability of the Brain Blood Barrier (BBB), and the surface area of the perfusing vessels.





## Quantitative T1 dataset

### Meta-properties

QUANTITATIVE T1 DATASET is RIGID (+R). QUANTITATIVE T1 DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A QUANTITATIVE T1 DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a QUANTITATIVE T1 ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every QUANTITATIVE T1 DATASET is an ANATOMICAL DATASET.

### Comment

[DEF] T1, also called longitudinal relaxation time (in milliseconds), is an intrinsic biophysical property of the tissue, related to macromolecule concentration, water binding and water content.

[QUESTION] Should this category also inherit from the modality semantic axis, e.g. MR DATASET? (This question applies to most of the following entities) We think the answer is NO. Should we define the specific parameter represented in this dataset? Not in a formal way.

## Quantitative T2 dataset

### Meta-properties

QUANTITATIVE T2 DATASET is RIGID (+R). QUANTITATIVE T2 DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A QUANTITATIVE T2 DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a QUANTITATIVE T2 ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every QUANTITATIVE T2 DATASET is an ANATOMICAL DATASET.

### Comment

[DEF] T2, also called transverse relaxation time (in milliseconds), is an intrinsic biophysical property of the tissues, also related to the bulk water content of the tissue.

## Quantitative T2 star dataset

### Meta-properties

QUANTITATIVE T2 STAR DATASET is RIGID (+R). QUANTITATIVE T2 STAR DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A QUANTITATIVE T2 STAR DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a QUANTITATIVE T2 STAR ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every QUANTITATIVE T2 STAR DATASET is an ANATOMICAL DATASET.

## Absolute proton density dataset

### Meta-properties

ABSOLUTE PROTON DENSITY DATASET is RIGID (+R). ABSOLUTE PROTON DENSITY DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] An ABSOLUTE PROTON DENSITY DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* an ABSOLUTE PROTON DENSITY ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every ABSOLUTE PROTON DENSITY DATASET is an ANATOMICAL DATASET.

### Comment

[DEF] The absolute proton concentration [1H] of a tissue defines the number of protons per unit volume of tissue. The absolute proton density of a tissue refers to the concentration of protons in this tissue, relative to that of the same volume of water at the same temperature. It is expressed in pu (percent units).

## Fractional anisotropy dataset

### Meta-properties

FRACTIONAL ANISOTROPY DATASET is RIGID (+R). FRACTIONAL ANISOTROPY DATASET is DEPENDENT (+D).

### Properties:

[EP/SLD] A FRACTIONAL ANISOTROPY DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a FRACTIONAL ANISOTROPY CALCULATION *at* a TIME INTERVAL. [EP/SL] Every FRACTIONAL ANISOTROPY DATASET is an ANATOMICAL DATASET.

### Comment

[DEF] The fractional anisotropy is proportional to the square root of the variance of the Eigen values divided by the square root of the sum of the squares of the Eigen values.

## Relative anisotropy dataset

### Meta-properties

RELATIVE ANISOTROPY DATASET is RIGID (+R). RELATIVE ANISOTROPY DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A RELATIVE ANISOTROPY DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a RELATIVE ANISOTROPY CALCULATION *at* a TIME INTERVAL. [EP/SL] Every RELATIVE ANISOTROPY DATASET is an ANATOMICAL DATASET.

## Diffusion tensor dataset

### Meta-properties

DIFFUSION TENSOR DATASET is RIGID (+R). DIFFUSION TENSOR DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A DIFFUSION TENSOR DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a DIFFUSION TENSOR CALCULATION *at* a TIME INTERVAL. [EP/SL] Every DIFFUSION TENSOR DATASET is an ANATOMICAL DATASET.

### Comment

[DEF] The DIFFUSION TENSOR DATASET reflects the directional dependence of the diffusion properties, independently of the orientation of the tissue with respect to the directions of measurements. D is calculated from a non diffusion-weighted image plus six or more diffusion-weighted measurements along non collinear directions.

## Mean diffusivity dataset

### Meta-properties

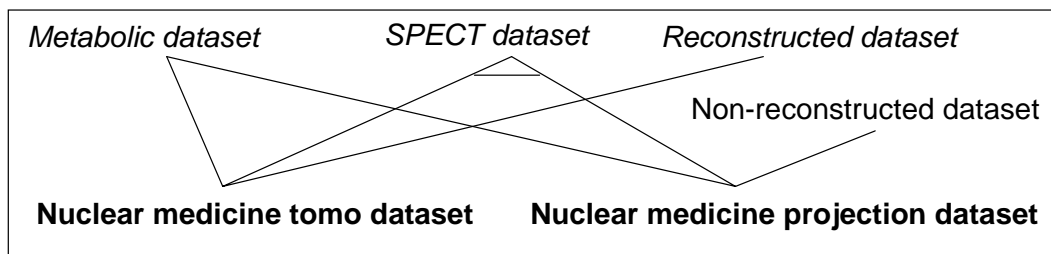
MEAN DIFFUSIVITY DATASET is RIGID (+R). MEAN DIFFUSIVITY DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A MEAN DIFFUSIVITY DATASET is PARAMETER QUANTIFICATION DATASET which *is a result of* a MEAN DIFFUSIVITY CALCULATION *at* a TIME INTERVAL. [EP/SL] Every MEAN DIFFUSIVITY DATASET is an ANATOMICAL DATASET

### Comment

[DEF] The mean diffusivity is the average value of the diffusion coefficients at this voxel. This can be estimated by the average of the eigen values of the diffusion tensor.



## Nuclear medicine tomo dataset

### Meta-properties

NUCLEAR MEDICINE TOMO DATASET is RIGID (+R). NUCLEAR MEDICINE TOMO DATASET is DEPENDENT (+D).

### Properties

[EP/SL] A NUCLEAR MEDICINE TOMO DATASET is a SPECT DATASET. [EP/SL] Every NUCLEAR MEDICINE TOMO DATASET is a METABOLIC DATASET. [EP/SL] Every NUCLEAR MEDICINE TOMO DATASET is a RECONSTRUCTED DATASET.

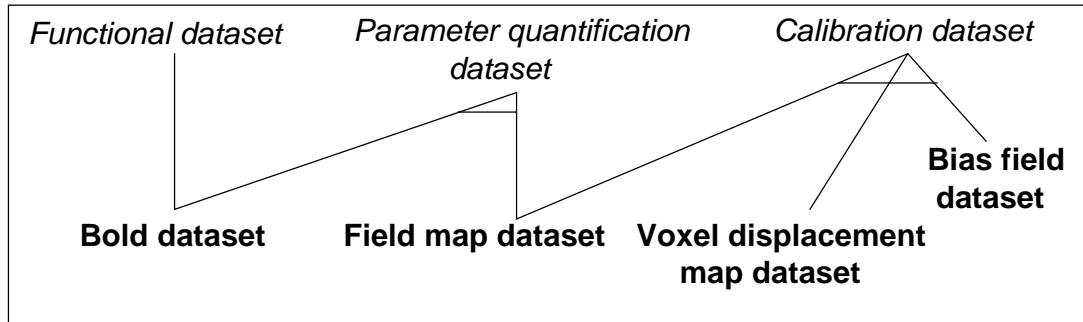
## Nuclear medicine projection dataset

### Meta-properties

NUCLEAR MEDICINE PROJECTION DATASET is RIGID (+R). NUCLEAR MEDICINE PROJECTION DATASET is DEPENDENT (+D).

## Properties

[EP/SL] A NUCLEAR MEDICINE PROJECTION DATASET is a SPECT DATASET.  
[EP/SL] Every NUCLEAR MEDICINE PROJECTION DATASET is a METABOLIC DATASET.  
[EP/SL] Every NUCLEAR MEDICINE PROJECTION DATASET is a NON-RECONSTRUCTED DATASET.



Bold dataset

## Meta-properties

BOLD DATASET is RIGID (+R). BOLD DATASET is DEPENDENT (+D).

## Properties

[EP/SLD] A BOLD DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a BLOOD OXYGEN LEVEL DEPENDENT SIGNAL CHANGES ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every BOLD DATASET is a FUNCTIONAL DATASET.

## Comment

[DEF] BOLD imaging is sensitive to blood oxygenation (but also to cerebral blood flow and volume). This modality is essentially used for detecting brain activation (functional MR). Echo planar imaging is used mainly with a Gradient sequence (T2\*-weighted). Presto or Spin echo (T2 weighted) sequences can also be used.

Field map dataset

## Meta-properties

FIELD MAP DATASET is RIGID (+R). FIELD MAP DATASET is DEPENDENT (+D).

## Properties

[EP/SLD] A FIELD MAP DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a FIELD MAP ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every FIELD MAP DATASET is a CALIBRATION DATASET.

Voxel displacement map dataset

## Meta-properties

VOXEL DISPLACEMENT MAP DATASET is RIGID (+R). VOXEL DISPLACEMENT MAP DATASET is DEPENDENT (+D).

## Properties

[EP/SLD] A VOXEL DISPLACEMENT MAP DATASET is a CALIBRATION DATASET which *is a result of* a VOXEL DISPLACEMENT MAP ESTIMATION *at* a TIME INTERVAL.

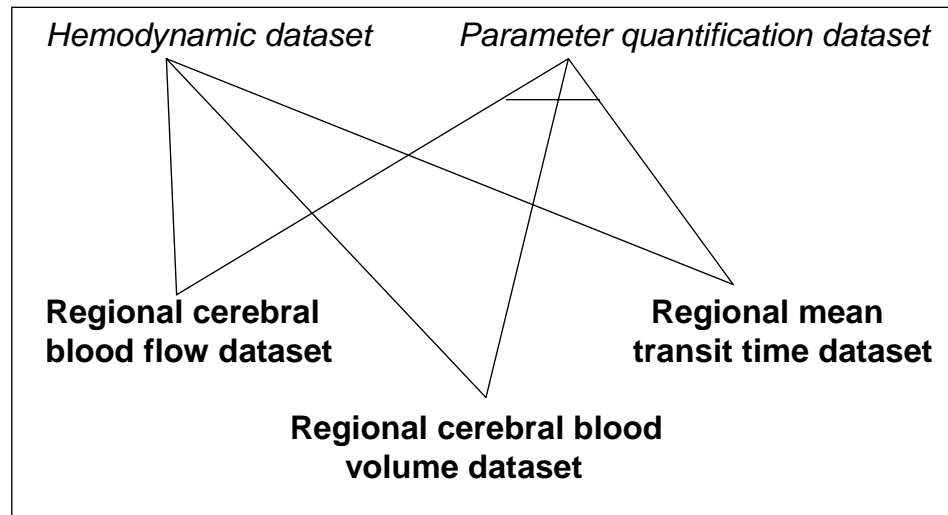
Bias field dataset

### Meta-properties

BIAS FIELD DATASET is RIGID (+R). BIAS FIELD DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A BIAS FIELD DATASET is a CALIBRATION DATASET which *is a result of* a BIAS FIELD ESTIMATION *at a* TIME INTERVAL.



### Regional cerebral blood flow dataset

#### Meta-properties

REGIONAL CEREBRAL BLOOD FLOW DATASET is RIGID (+R). REGIONAL CEREBRAL BLOOD FLOW DATASET is DEPENDENT (+D).

#### Properties

[EP/SLD] A REGIONAL CEREBRAL BLOOD FLOW DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a REGIONAL CEREBRAL BLOOD FLOW ESTIMATION *at a* TIME INTERVAL. [EP/SL] Every REGIONAL CEREBRAL BLOOD FLOW DATASET is a HEMODYNAMIC DATASET.

#### Comment

[DEF] Cerebral blood flow (represented in milliliters of blood per gram of tissue per minute) can be calculated from diverse measurements, such as a T2 or T2 STAR WEIGHTED DCE MR DATASET, or a SPIN TAGGING PERFUSION MR DATASET.

### Regional cerebral blood volume dataset

#### Meta-properties

REGIONAL CEREBRAL BLOOD VOLUME DATASET is RIGID (+R). REGIONAL CEREBRAL BLOOD VOLUME DATASET is DEPENDENT (+D).

#### Properties

[EP/SLD] A REGIONAL CEREBRAL BLOOD VOLUME DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a REGIONAL CEREBRAL BLOOD VOLUME ESTIMATION *at a* TIME INTERVAL. [EP/SL] Every REGIONAL CEREBRAL BLOOD VOLUME DATASET is a HEMODYNAMIC DATASET.

#### Comment

[DEF] Cerebral blood volume (represented in milliliters of blood per gram of tissue) can be calculated from diverse measurements, such as a T2 or T2 STAR WEIGHTED DCE MR DATASET.

## Regional mean transit time dataset

### Meta-properties

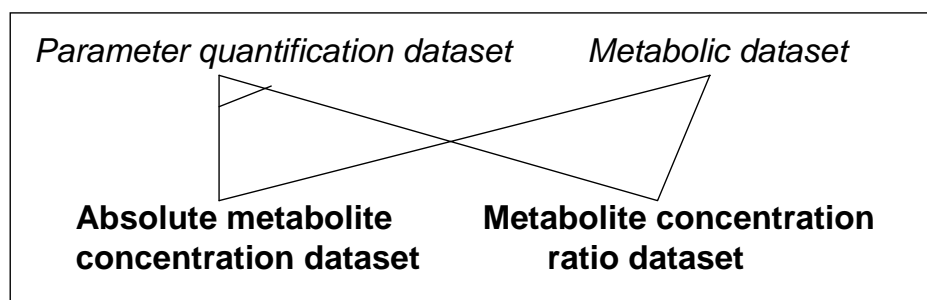
REGIONAL MEAN TRANSIT TIME DATASET is RIGID (+R). REGIONAL MEAN TRANSIT TIME DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A REGIONAL MEAN TRANSIT TIME DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a REGIONAL MEAN TIME TRANSIT TIME CALCULATION *at* a TIME INTERVAL. [EP/SL] Every REGIONAL MEAN TRANSIT TIME DATASET is a HEMODYNAMIC DATASET.

### Comment

[DEF] The regional mean transit time, rMTT, is the average time it takes the tracer substance to pass through the vascular bed within the voxel ( $rMTT = rCBV/rCBF$ ).



## Absolute metabolite concentration dataset

### Meta-properties

ABSOLUTE METABOLITE CONCENTRATION DATASET is RIGID (+R). ABSOLUTE METABOLITE CONCENTRATION DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] An ABSOLUTE METABOLITE CONCENTRATION DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* an ABSOLUTE METABOLITE CONCENTRATION ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every ABSOLUTE METABOLITE CONCENTRATION DATASET is a METABOLIC DATASET.

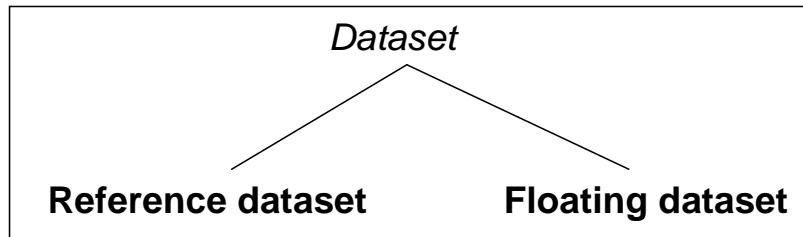
## Metabolite concentration ratio dataset

### Meta-properties

METABOLITE CONCENTRATION RATIO DATASET is RIGID (+R). METABOLITE CONCENTRATION RATIO DATASET is DEPENDENT (+D).

### Properties

[EP/SLD] A METABOLITE CONCENTRATION RATIO DATASET is a PARAMETER QUANTIFICATION DATASET which *is a result of* a METABOLITE CONCENTRATION RATIO ESTIMATION *at* a TIME INTERVAL. [EP/SL] Every METABOLITE CONCENTRATION RATIO DATASET is a METABOLIC DATASET.



Reference dataset, target

**Meta-Properties**

REFERENCE DATASET is ANTI-RIGID ( $\sim\mathbf{R}$ ). REFERENCE DATASET is DEPENDENT ( $+\mathbf{D}$ ).

**Properties**

[EP/SL] A REFERENCE DATASET, or TARGET, is a DATASET.

**Comment**

[DEF] A DATASET is used as a REFERENCE DATASET in the context of a Registration Data Processing. The REFERENCE DATASET (also called target) provides the sampling grid according to which the FLOATING DATASET will be resampled.

Floating dataset, source

**Meta-Properties**

FLOATING DATASET is RIGID ( $\sim\mathbf{R}$ ). FLOATING DATASET is DEPENDENT ( $+\mathbf{D}$ ).

**Properties**

[EP/SL] A FLOATING DATASET, or SOURCE, is a DATASET.

**Comment**

[DEF] A DATASET is used as a FLOATING DATASET in the context of a Registration Data Processing. During the registration, the FLOATING DATASET (also called source) is resampled in the sampling grid provided by the REFERENCE DATASET.