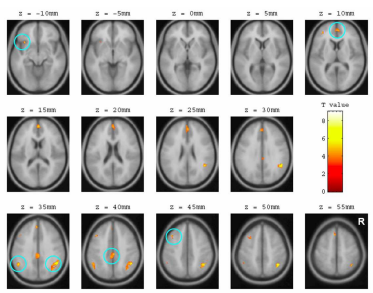


## Summary

The Brede Wiki running on MediaWiki software represents data in templates. Data is from published peer-reviewed neuroscience articles. Further information is ontologies of, e.g., brain regions and brain functions. Since data in the templates is represented in a simple format all template data can be extracted and represented in SQL. From an SQL database specialized search can be performed.

## Background

Neuroscience produces a wealth of data of different sorts. Neuroimaging uses positron emission tomography or magnetic resonance imaging brain scanners and may report results as 3D coordinates indicating foci of peak brain activation.



Example data from Lin et al. (2008)<sup>1</sup> CC-by.

Several databases exist for storing these data,<sup>2</sup> but contributing data is not straightforward. A structured wiki might be good for organizing this data.

## Example page from the Brede Wiki

## Brede Wiki templates

The templates used in the Brede Wiki may be grouped in four categories

1. Non-hierarchical  
Templates used to describe the concept on the wiki page. A wiki page may represent a researcher and a Researcher template is added on the top of the page with fields such as name. Other similar templates are Paper and Journal.
2. Hierarchical  
Templates used to describe the concept of the wiki page, which furthermore can be organized in a hierarchy — a simple ontology: Brain region, Cognitive component, Organization, Software.
3. On-page — single  
Besides the main template on a page multiple other templates are used in the Brede Wiki, e.g., to describe the methodology in a paper: Subject group, Mri scanning, Pet scanning, Psychoexperimental condition.
4. On-page — multiple  
Templates where multiple instantiations are formatted into a single HTML table: Talairach coordinate, Brain volume, Gene personality association.

The template instantiations are **non-nested**, all use **lower case** field and template names and field values are **without wiki markup and links**. Links are constructed in the template definitions.

## SQL of template data

SQL can be generated from the data in the templates. Since the template instantiations are simple the extraction of data from the wiki templates is complete, i.e., all template data can be extracted and represented in SQL.

Two kinds of SQL tables are constructed from the Brede Wiki template data:

1. One master table where the template field names are represented as SQL values.
2. Secondary tables where template field names are SQL table columns. Here is one table for each template definition, e.g., the `{{Paper | ...}}` template is associated with the SQL table called `brede_paper`

Example template in MediaWiki markup:

```
{{Paper | author1 = Tim | author2 = Wendy | title = Semantic Web }}
```

Simplified master SQL table:

```
CREATE TABLE brede(title, template, field, fid, value)
```

with simplified data for inserts:

```
("The Web", "paper", "author", 1, "Tim")
```

```
("The Web", "paper", "author", 2, "Wendy")
```

```
("The Web", "paper", "title", 1, "The Web")
```

Definition for secondary SQL tables can for example be

```
CREATE TABLE brede_paper(_title, _author1, _author2, _title)
```

And simplified data for inserts:

```
("The Web", "Tim", "Wendy", "The Web")
```

With the SQL database complex queries can be made on all data encoded in the templates of the Brede Wiki. So far our only Web-service is for searching for nearby brain coordinates using SQLite.

## Automated linking and querying for coordinate data

### Parent brain region

### Coordinate table in Brede Wiki

Isolated three-argument verbs (V3)

Supplementary material, upper right table with 5 coordinates.

Anatomy	BA	X	Y	Z	No. vox	Z	Coordinate search	Plot
1. Right middle/inferior occipital	18	40	-86	-1	5,5	Brede Database @ Brede Wiki @ SumDB @ ICBM @ ITA @		
2. Left inferior occipital	19	40	-71	-15	5,1	Brede Database @ Brede Wiki @ SumDB @ ICBM @ ITA @		
3. Left inferior frontal	18/17	-36	-86	-6	5,4	Brede Database @ Brede Wiki @ SumDB @ ICBM @ ITA @		
4. Left inferior frontal	47	-48	27	-5	4,0	Brede Database @ Brede Wiki @ SumDB @ ICBM @ ITA @		
5. Left middle temporal	21	-61	-31	-3	3,7	Brede Database @ Brede Wiki @ SumDB @ ICBM @ ITA @		

Entry not completed

### Brain region

### WOR01: 266 - Left middle temporal gyrus

Variables: Middle temporal gyrus, left

External databases

13000-Matveyev: 65

Taxonomy

Parents: Middle temporal gyrus, Left temporal lobe

Siblings: Children

Talairach coordinates

X	Y	Z	Label	WOR01	WOR02
-71	-38	-1	Left middle temporal gyrus	55	25
-60	-30	-5	Left middle temporal gyrus	30	116
-49	-22	-10	Left middle temporal gyrus	35	117
-44	-66	12	Left middle temporal gyrus	35	119
-42	-60	15	Left middle temporal gyrus	35	121
-50	-20	-8	Left middle temporal gyrus	49	162
-54	-26	-5	Left middle temporal gyrus	49	164
-50	-30	-8	Left middle temporal gyrus	49	165
-40	-8	-4	Left middle temporal gyrus	73	228
-57	-18	-10	Left middle temporal gyrus	63	254
-48	-42	-1	Left middle temporal gyrus	68	280
-48	-72	1	Left middle temporal gyrus	68	281
-50	-44	-1	Left middle temporal gyrus	153	328

Brain region in the Brede Database

### External visualization with ICBM View

### Brede Wiki — Talairach coordinate search

Search after location (Talairach coordinate) in the Brede Wiki

Search for location search (line coordinate) e.g., 14 -4 -15

Brede Database search (line coordinate)

Brede Database search (line coordinate)

Search for location search (line coordinate)

#	Distance	X	Y	Z	Anatomy	Paper in Brede Wiki
1	10.0	27	-85	-1	Left posterior inferior temporal sulcus	Human brain activity time-linked to generalised event potentials: C3001: Active Neuroscience
2	10.8	-42	-78	-10	Left inferior occipital	Word and non-word reading: what role for the visual word form area? (2005) Neuroscience
3	11.4	-39	-79	-6	Left inferior occipital sulcus	Activation of human language processing brain regions after the presentation of lexicon-nerve output: dissociated with event-related functional magnetic resonance imaging (1999) Neuroscience Letters
4	11.8	-72	-6	-2	Superior temporal gyrus	Neuroanatomical correlates of externally and internally generated human emotion (2001) American Journal of Psychiatry
5	13.8	-25	-9	-1	Left occipital	Functional modulation of body-selective visual areas: C3007: Social Cognitive and Affective Neuroscience
6	14.9	-47	-78	-2	Left occipitotemporal	Functional modulation of body-selective visual areas: C3007: Social Cognitive and Affective Neuroscience
7	18.4	-38	-88	-12	Left occipital	Functional modulation of body-selective visual areas: C3007: Social Cognitive and Affective Neuroscience
8	18.6	-22	-96	-1	Left middle and inferior occipital sulcus	Neural correlates of successful encoding identified using functional magnetic resonance imaging (2002) The Journal of Neuroscience
9	20.4	-24	-97	-1	Left middle-occipital gyrus	Neural correlates of successful encoding identified using functional magnetic resonance imaging (2002) The Journal of Neuroscience
10	22.4	-38	-66	-10	Lateral cerebellum	Neuroanatomical correlates of externally and internally generated human emotion (2001) American Journal of Psychiatry
11	23.0	-47	-69	-5	Left occipitotemporal	Functional modulation of body-selective visual areas: C3007: Social Cognitive and Affective Neuroscience
12	25.9	-49	-70	-14	Left occipitotemporal	Functional modulation of body-selective visual areas: C3007: Social Cognitive and Affective Neuroscience
13	26.8	-68	-67	-1	Left fusiform gyrus	Neural correlates of successful encoding identified using functional magnetic resonance imaging (2002) The Journal of Neuroscience

Off-wiki coordinate search with data from the Brede Wiki

## Further issues

**Formatting:** Brede Wiki template coordinate data can be formatted from a Matlab image analysis program. Another of our structured wikis can output its personality genetics data in template format ready for inclusion in the Brede Wiki. MediaWiki extensions might be of interest for in-wiki form input.

**Download:** MediaWiki dumps of the Brede Wiki as well as SQL and SQLite files are available from the Brede Wiki homepage. From the ontologies a SKOS<sup>3</sup> file is also produced.

**Why not Wikipedia and DBpedia?:** Much of the information in the Brede Wiki will not be notable enough, so Wikipedia administrators would delete the page. Furthermore, building our own wiki allows us to keep the templates simple so extraction can be complete, i.e., all data from the templates can be extracted.

**Other database:** The Brede Wiki links to, e.g., Brede Database, PubMed, NeuroLex wiki. So far it is not possible to automatically translate data from, e.g., the Brede Database to the Brede Wiki.

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## References

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