

# PhenoWiki+: PhenoMining Based Wiki for Consortium for Neuropsychiatric Phenomics(CNP)

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# Overview

- Introduction
- PhenoMining Tools
- Annotation Facility
- Personal WorkSpace
- User Feedback
- Conclusion
- Acknowledgements
- References

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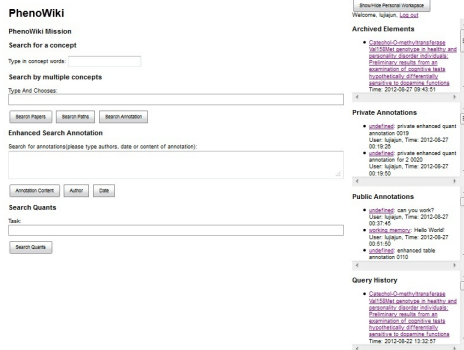
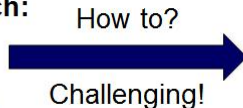


Figure: PhenoWiki+ home page

## Neuroscience Research:

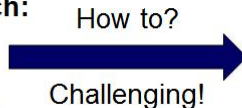
- Published literature
- Experimental data
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- Summarize knowledge
- Distill useful information

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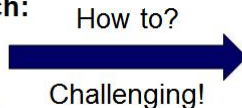
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# Introduction

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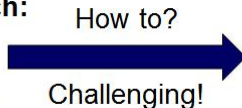
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- A **wikipedia** system for **phenomics**.

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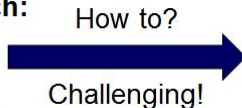
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- A framework for users to **update** and **organize** experimental results and information from literature.

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## PhenoWiki:

- A **wikipedia** system for **phenomics**.
- A framework for users to **update** and **organize** experimental results and information from literature.
- A **search** facility to retrieve the desired data.



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- Unable to represent **complex relationship** among the data and knowledge
- Unable to support **multi-concept** query and search for **literature content**
- Does not have **annotation** facility

# PhenoMining + PhenoWiki = PhenoWiki+

**PhenoMining** PhenoMining provides **properties and relationship among phenotypes**, such as the relations between concepts at different phenolevels and their conditional co-occurrence.

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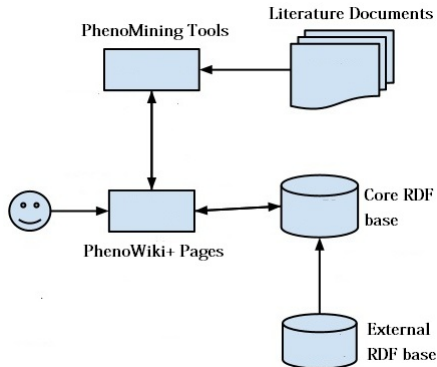


Figure: Data flow of PhenoWiki+ and PhenoMining system



- **PhenoMining Tools**
- Annotation Facility
- Personal WorkSpace
- User Feedback

# PhenoMining Tools

Extracting key information from data source to insert into phenowiki+.

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Welcome, test. [Log out](#)

## PhenoWiki

**PhenoWiki Mission**

**Search for a concept**

Type in concept words:

**Search by multiple concepts**

Type something:

**Search Quants**

Task:

# Assertion Mining

Mining sentences and paragraphs relating one or more concept terms.

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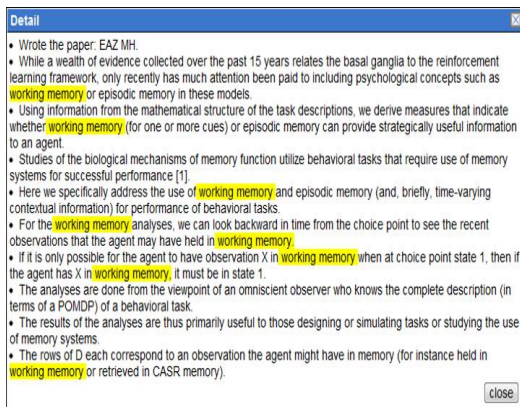


Figure: Assertion Mining in PhenoWiki+ Screenshot

# Document Content Explorer

Based on concepts explore information from literature.

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Based on concepts explore information from literature.

### Document Content Search

Threshold: 0

#### Concepts Appeared Above Threshold

- [schizophrenia\\_schizophreniform\\_dementia\\_praecox\\_schizoaffective\\_schizophrenic](#) Archive
- [Attention Deficit Disorder with Hyperactivity, Attention Deficit Disorders with Hyperactivity, Attention Deficit Hyperactivity Disorders, Hyperkinetic Syndrome, adhd, Attention Deficit Disorder, Attention Deficit Hyperactivity Disorder, ADDH](#) Archive
- [inhibition](#) Archive
- [working memory, short recall, short memory, STM, WM, immediate recall, immediate memory, short term memory, shortterm memory](#) Archive
- [Telencephalon, cerebrum](#) Archive
- [PFC, prefrontal cortex, prefrontal area](#) Archive
- [Parietal lobe, Parietal Cortex](#) Archive
- [Cingulate gyrus, gyrus cinguli, Cingulate, cingular gyrus](#) Archive
- [Hippocampus, Ammon Horn, hippocampal, horn of amun.](#) Archive

assertions (16) task assertions (1) sample assertions (10)  
indicator assertions (3)

### Abstract

- Both the dopamine transporter (DAT) and dopamine D2 receptors (encoded by DRD2) critically regulate dopamine signaling in the striatum and in prefrontal cortex during memory.
- Results indicated a significant DRD2/DAT interaction in prefrontal cortex and striatum BOLD activity during both **working memory** and encoding of recognition memory.
- Taken together, our results demonstrate that the interaction between genetic variants in DRD2 and DAT critically modulates the non-linear relationship between dopamine and neuronal activity during memory processing.

### Introduction

- Studies in animals and in humans strongly implicate D2 receptors and the DAT in regulating **working memory** performance and prefronto-striatal neuronal activity (Arnsten et al., 1995; Kimberg et al., 2001; Mozley et al., 2001; Glickstein et al., 2002; Cropley et al., 2006; Kellendonk et al., 2006; Mehta and Riedel, 2006; Chou et al., 2007).
- Consistently, we have demonstrated that a novel intronic DRD2 polymorphism (rs1076560, G>T) of the D2 receptor affects both relative expression of D2S in prefrontal cortex/striatum and activity of the striato-thalamic-prefrontal pathway during **working memory** in healthy subjects (Zhang et al., 2007) and in patients with schizophrenia (Bertolino et al., 2008a).
- Based on this prior evidence, we used fMRI in healthy subjects to explore the relationship of DRD2 and DAT functional polymorphisms with brain activity during **working memory**.

Figure: Document Content Explorer in PhenoWiki+ Screenshot

- PhenoMining Tools
- **Annotation Facility**
- Personal WorkSpace
- User Feedback



# Annotation Facility

Annotation can be **linked** and **combined** to describe the **relationship** among annotated objects.

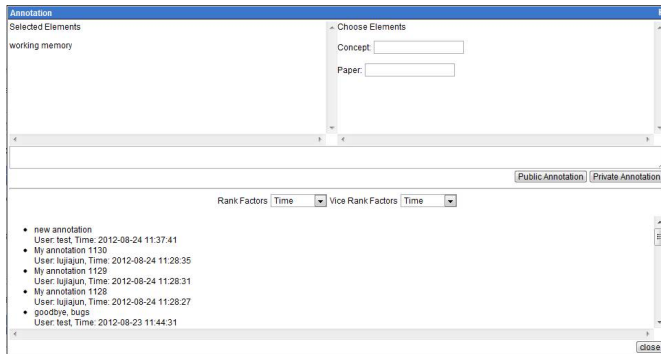


Figure: Screenshot of Annotation User Interface

# Annotation Facility

Search by:

- Author and Date
- Annotated Objects
- Annotation Contents

## Search Annotation

Search for annotations(please type authors, date or content of annotation):

Annotation Content

Author

Date

Figure: Screenshot of Annotation Search Panel

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# Personal WorkSpace

Show/Hide Personal Workspace

Welcome, test, [Log out](#)

**Archived Elements**

- [working memory](#)  
Time: 2012-08-22 13:04:58
- [The Influence of Markov Decision Process Structure on the Possible Strategic Use of Working Memory and Episodic Memory](#)  
Time: 2012-08-22 13:31:30
- [maintenance](#)  
Time: 2012-08-22 13:37:40

**Private Annotations**

- [working memory](#): first private annotation  
User: test, Time: 2012-08-15 11:53:47
- [working memory](#): second private annotation  
User: test, Time: 2012-08-15 11:55:06
- [working memory](#): third private annotation for working memory  
User: test, Time: 2012-08-22 13:34:52

**Public Annotations**

- [undefined](#): first public annotation for Influence of Markov  
User: test, Time: 2012-08-22 13:35:45
- [undefined](#): quant annotation defined 8221528  
User: test, Time: 2012-08-22 15:28:41
- [undefined](#): quant annotation defined 8221528  
User: test, Time: 2012-08-22 15:28:41

**Query History**

- [The Influence of Markov Decision Process Structure on the Possible Strategic Use of Working Memory and Episodic Memory](#)  
Time: 2012-08-22 13:31:24
- [Catechol-O-methyltransferase Val158Met genotype in healthy and personality disorder individuals: Preliminary results from an examination](#)

Figure: Four Types of Personal WorkSpaces

# Personal WorkSpace

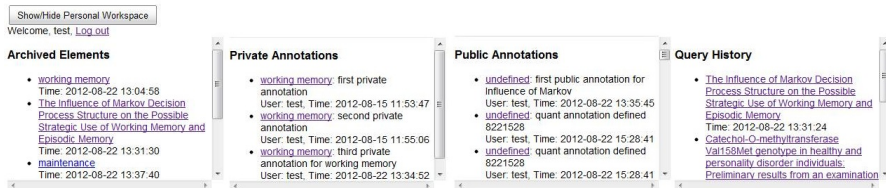


Figure: Four Types of Personal WorkSpaces

- Archive objects of **interest** for future revisit.

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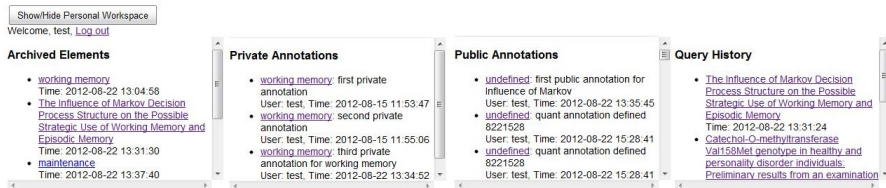


Figure: Four Types of Personal WorkSpaces

- Archive objects of **interest** for future revisit.
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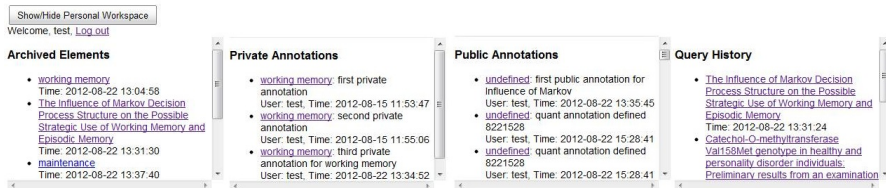


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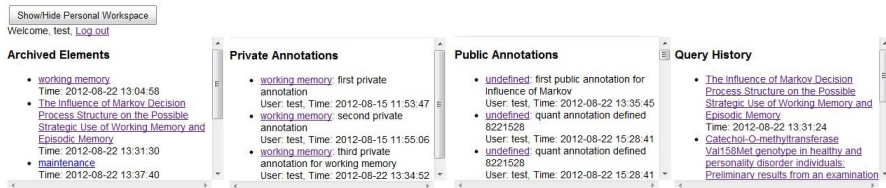


Figure: Four Types of Personal WorkSpaces

- Archive objects of **interest** for future revisit.
- Public annotation for users to **share**.
- Private annotation for **private use** only.
- Record past query **history** for future references.



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The following comments from Neuroscientists provide useful feedbacks to improve the usability of the system.

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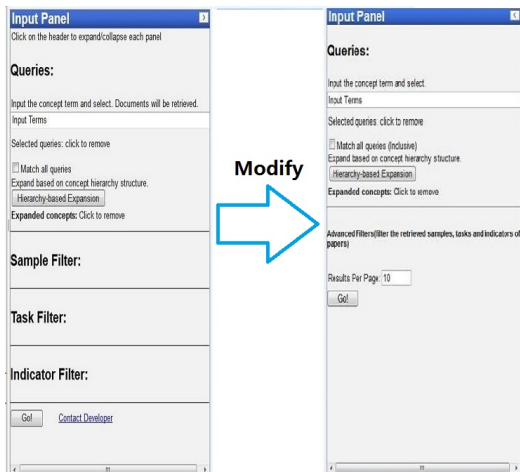
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- Design GUI interface similar to Google or YouTube.
- Keep the GUI simple with less **redundant** information.
- Highlight the usefulness of **PhenoMining** tools.

# An Example of GUI Modification According to Feedback



# Conclusion

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- PhenoWiki+ uses **text mining tools** from PhenoMining, which greatly improve the usability and scalability of PhenoWiki.
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## Future Work:

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## Future Work:

- More collaborative studies with neuroscientists are needed to improve the system scalability and usability.

# Acknowledgements

I wish to thank Professor Wesley Chu for his guidance and suggestions to the project. Chen Liu for providing implementation directions and resolving technical difficulties. I also like to thank Prof. Carrie Bearden and her graduate students Rachel Jones and Caroline Montoyo for their valuable feedback on the PhenoMining and PhenoWiki+. And thank the CSST committee for their support!

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# Thank you!