

Data Sharing within the BIOMEDICAL INFORMATICS RESEARCH NETWORK: Experiences of the FIRST BIRN and Morphometry BIRN Testbeds

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Purpose. Many MRI studies of various clinical populations involve sample sizes which are small and restricted to specific populations. The intelligent, directed combination of data from such studies is crucial. Researchers must be ready to account for differences in technique, equipment and population focus and to overcome the challenges of accessing and sharing large datasets. Useful data sharing requires adequate descriptions of the methods, analyses, and experimental design and population (meta-data). Equally important to these technological issues are successful solutions to the problems of subject confidentiality, authorship, and IP issues. Methods. The FIRST BIRN and Morphometry BIRN are multi-site projects funded by NCR and NIH (www.nbirn.net) to develop the methods for data collection, combination, and sharing from imaging protocols, for the following goals: 1) Standardized calibration of equipment and imaging activation paradigms using geometric and human phantoms; 2) Collection of MRI and/or fMRI data using a standardized protocol on clinical populations at different sites, while including the added value of each site's own methods; 3) Combining MRI, fMRI, clinical and behavioral data into a federated database, leading to a deeper understanding of the functional neuroanatomy of the underlying disease than would be possible with any individual site's data. The eleven sites involved in the projects have people dedicated to the purposes of collecting calibration imaging data, developing analysis methods, determining experimental paradigms where needed, developing robust and expandable data storage and retrieval methods, populating a virtual data grid, and designing a searchable federated database of MRI and clinical data from multiple sites. Conclusions. The unified initial efforts of researchers across universities have resulted in enjoyable collaborations and productive approaches to human subject data sharing, experimental design, MRI data standardization, and clinical and imaging database design.

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Purpose. Many fMRI studies of schizophrenia involve sample sizes which are small and restricted to specific populations. The intelligent, directed cross-correlation of such studies is crucial. Researchers must be ready to account for differences in technique, equipment and population focus and to overcome the challenges of accessing and sharing large datasets. Methods. The FIRST BIRN is a multi-site project funded by NCCR and NIH (www.nbirn.net) for the following goals: 1) Standardized calibration of equipment and imaging activation paradigms using **geometric** and human phantoms; 2) Collection of fMRI data using a standardized protocol on populations of persons with schizophrenia at different sites, while including the added value of each site's own methods; 3) Combining fMRI data into a federated database, leading to a deeper understanding of the functional neuroanatomy of schizophrenia than would be possible with any individual site's data. The eleven sites involved in the project have **people dedicated** to the purposes of collecting calibration fMRI data, developing analysis methods, determining an experimental paradigm, populating a virtual data grid, and designing a searchable federated database of MRI and clinical data from multiple sites. Conclusions. The unified efforts of researchers across universities have resulted in novel approaches to human subject data sharing, experimental design, fMRI data standardization, and clinical and imaging database design. Issues related to multi-site integration of fMRI images will be demonstrated for data obtained on a sensorimotor task.

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BIOMEDICAL INFORMATICS RESEARCH NETWORK: FUNCTIONAL IMAGING RESEARCH IN SCHIZOPHRENIA TESTBED

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Purpose. Many projects in neuroscience involve studies of the brains of humans and animals, in health and disease. The projects use a variety of experimental and imaging techniques and are focused at all scales from the molecular to the systemic. The sample sizes are usually small and restricted to specially chosen populations. What is crucial is the intelligent, directed cross-correlation of such studies. To do this, groups of neuroscientists must be ready to account for differences in technique, equipment and population focus and to overcome the challenges of accessing and sharing large datasets.

Methods. The Functional Imaging Research in Schizophrenia Testbed (FIRST BIRN) is a multi-site project funded by NCCR and NIH for the following goals: 1) Standardization and calibration of equipment and imaging activation paradigms using mechanical and human phantoms; 2) Collection of fMRI data using a standardized protocol on populations of persons with schizophrenia at different sites, while including the added value of each site's unique methods; 3) Combining unique imaging data collected with diverse activation methods into the federated database, leading to a deeper understanding of the functional neuroanatomy of schizophrenia than would have been possible with any individual site's data. The eleven sites involved in the project have each dedicated people to the purposes of collecting standardization and calibration fMRI data, developing analysis methods, determining an experimental paradigm, populating a virtual data grid, and designing a searchable federated database of imaging and clinical data from multiple sites.

Conclusions. The unified efforts of researchers across universities has resulted in novel approaches to human subject data sharing, experimental design, fMRI data standardization, and clinical and imaging database design. Issues related to multi-site integration of fMRI images will be demonstrated for data obtained on a sensorimotor task.

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