National Neuropsychology Network

Welcome!

Dear Colleagues,

Welcome to the inaugural newsletter from the National Neuropsychology Network (NNN). We are just about to complete our second year of work on this exciting project and thank you for expressing interest in this work. Our overarching vision for the NNN is to support advances in clinical neuropsychology practice and research based on empirical evidence. To that end, the NNN was launched with three specific aims:
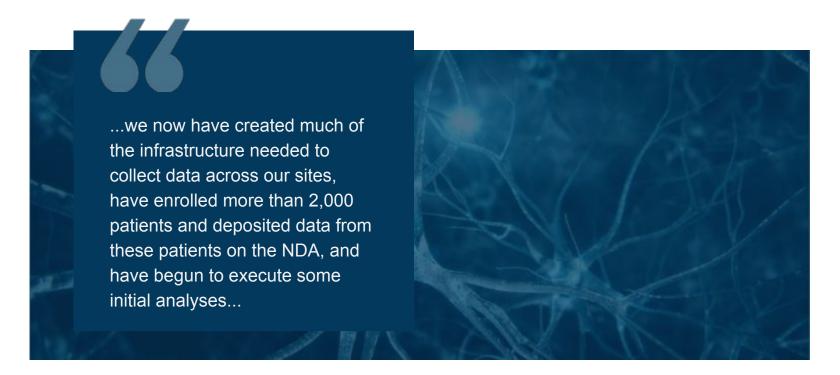
Develop infrastructure

To provide a "proof of concept" demonstration that clinical training sites could work collaboratively and share raw, item-level data from NP assessments of our patients, we needed to develop methods and software to capture the data and route the findings securely to a shared repository. We aimed to collaborate with Pearson to get data on the Q-interactive platform and create our own NNN platform for additional tests that are the most widely administered.

Collect data & deposit to the NIMH data archive

The ambitious aims are to enroll 10,000 cases and deposit item-level data in the NIMH Data Archive, also known as the NDA. Following clinical practice as usual, we aim to gather data on about 50 of the most widely used NP tests, across a wide range of clinical syndromes seen in our clinics. These aims include standardizing pre- and post-exam diagnoses so we can determine which NP tests make a real difference.

Analyze data & create proposals for future innovation in NP assessment

By databasing large amounts of item-level data we aim to identify the latent constructs measured by the NP tests and determine the most efficient measurement methods to identify these constructs, leading to proposal for new tests and batteries. Assessment of the future can be more efficient and more precise.

National Neuropsychology Network (NNN)

A brighter future for clinical neuropsychology

We are happy to report that we now have created much of the infrastructure needed to collect data across our sites, have enrolled more than 2,000 patients and deposited data from these patients on the NDA, and have begun to execute some initial analyses showing how modern psychometric approaches can enhance efficiency of some of our most widely used measures. More details of this progress are noted below.

We also hope during the coming year to expand the NNN to include other sites beyond our initial four collaborating centers. We hope you will continue to be interested in this collaborative effort and consider participating further in the NNN, to help promote its growth. Working together, we are confident we can create a brighter future for clinical neuropsychology and enhance access for patients worldwide.

- Robert Bilder on behalf of the NNN Investigators

Interested in hearing more?

Listen to the Nav Neuro podcast, episode 33 "Neuropsychology 3.0" about NNN and related topics.

Check out the presentation by Reise et al. 2021 at the INS Annual Meeting – see how WAIS-IV Matrix Reasoning might use 10 or fewer items using computerized adaptive algorithms.

2020 at a Glance

What did we accomplish?

Development of the System for Acquisition of Item Level and Observational Responses (SAILOR)

We successfully programmed a response input system, which is a secure web application that examiners use to record responses on tests that are not part of Pearson's Q-Interactive platform. These include:

- **PAR**: Benton Facial Recognition Test; Hopkins Verbal Learning Test, Revised; Judgment of Line Orientation; Brief Visuospatial Memory Test, Revised; Rey Complex Figure Test; Wisconsin Card Sorting Task
- **MHS**: Test of Memory Malingering
- **Pearson**: Beck Anxiety Inventory; Beck Depression Inventory, 2nd Edition; Test of Premorbid Function (TOPF)
- **Pro-Ed, Inc**.: Boston Naming Test
- **Lafayette Instrument Company**: Grooved Pegboard Test; Finger Tapping Test
- **Emory University**: Emory Semantic Fluency Paradigm
- Columbia Auditory Naming Test
- Symbol Digit Modalities Test

The response input system emulates closely to the original vendor paper-pencil test forms, but enables automated execution of start-stop rules, branching, and scoring, so that like Q-interactive, the complete scores are available immediately upon the end of administration.

We also have now completed programming of a comprehensive output form, that enables users to select, using checkboxes, the normative groups to which they would like comparisons on the tests administered, and the system generates a score summary output table similar to those used in most NP clinics nationwide. Together with the SHiP-NP developments (see below), the NNN now has available automated methods to replace some of the most time-consuming aspects of NP assessment.

Pearson's Q-Interactive

We have established a collaboration with Pearson, which has enabled us to create a data pipeline between Pearson's Q-Interactive platform and our database. The data pipeline is used to import Q-Interactive data at the item level, including diverse qualitative observations and notes that are created by examiners. The result is an import that goes beyond the Q-Interactive output provided routinely, and that can be customized to provide users with additional details about their patients, and that will enable this detail to be analyzed by the scientific community. The Q-Interactive tests from which data is being collected include:

- WAIS-IV
- WMS-IV
- D-KEFS
- CVLT 3
- RBANS
- **RAVLT** *(coming soon)*
- **WIAT** *(coming soon)*

Data Analysis, Presentations & Publications

With the infrastructure now largely in place, we are beginning to share the ideas, products, and tools created by the NNN. We presented a peer-reviewed symposium entitled "Toward Precision Neuropsychology" at the 2020 Annual Meeting of the International Neuropsychology Society (INS) with five presentations about NNN components, delivered by Bauer, Bilder, Cavanagh, Drane & Loring, and Umfleet.

This year we will be presenting at INS one of the first products of scientific analysis of NNN data: Item Response Theory Analyses of Matrix Reasoning: Towards a New Short Form or Adaptive Test? This presentation with lead author Steve Reise shows how our rapid aggregation of item-level data can lead to substantial changes in NP testing.

In this proof-of-principle example, we show that the WAIS-IV Matrix Reasoning subtest, one of the most widely used in clinical neuropsychology, can in theory be abbreviated from its standard 26-item format to only 10 items without sacrificing much precision for the majority of test-takers. This work is now being expanded to incorporate additional psychometric analyses and we hope will be submitted for publication in early 2021.

We also were accepted for publication of an original manuscript that describes the Rationale and Design of the National Neuropsychology Network in the Journal of the International Neuropsychology Society. We believe this work will lay the groundwork and help introduce the NNN overall design and operation to clinicians and scientists in our shared discipline.

Structured History Protocol for Neuropsychology (SHiP-NP)

The SHiP-NP is an evidence-based, on-line structured protocol for collecting history and self-report data that are important for neuropsychological exams, using methods selected to be consistent with NIH Common Data Element (CDE) standards. We completed all programming for the SHiP-NP, and it is now in active use at the UCLA site and being rolled out to our other sites.

Built into the SHiP-NP is a branching series of questions about psychopathology, starting with the DSM-5 Level 1 Cross-Cutting Symptom Measure (CCSM), with positive responses on the CCSM leading to PROMIS Level 2 assessments. The WHODAS 2.0 is also included as a measure of disability. These methods are all created to follow the vision of the NIMH workgroup on Common Data Elements (Barch et al., 2016).

SHIP-NP CLINIC WORKFLOW

Links to the SHiP-NP are sent to patients before their initial visits for NP exams by clinic administrative staff.

Patients complete the SHiP-NP prior to their NP evaluation.

Clinicians review data via a tabular (.csv) or text (.txt) output format. The format is copied and pasted into either an Excel spreadsheet or Word document.

The Effects of the Pandemic on the NNN Study

The global pandemic led to an immediate curtailment of NP assessments nationwide. With fewer assessments being completed across our four original sites, we experienced a lull in patient enrollment in our study. Our clinics were quick to return to providing service via teleneuropsychology (TeleNP) platforms, and the flow has only recently returned to pre-pandemic levels. As of 12/1/2020, we reported cumulative enrollment of 2045 cases, an increase of 621 over the prior period, in which we had enrolled only 261 cases.

We recognized that this period of remote NP testing was an apt time to roll out the SHiP-NP. As mentioned above, the SHiP-NP was successfully implemented into UCLA's clinic in September 2020, and it will be integrated into our other sites' clinic workflow in the upcoming months.

Presentations &
Publications

Interested in learning more about the NNN?

Check out our presentations and publications. Citations are listed below. Copies of the presentations may be found on our website at https://sistat.ucla.edu/nnnweb/publications.html

Publications:

Bilder, R.M., & Reise, S.P. (2019). Neuropsychological tests of the future: How do we get there from here? *The Clinical Neuropsychologist*, 33(2), 220-245. doi:10.1080/13854046.2018.1521993

Mansolf, M., Vreeker, A, Reise, S.P., Freimer, N.B., Glahn, D.C., Gur, R.E., Moore, T.M., Pato, C.N., Pato, M.T., Palotie, A., Holm, M., Suvisaari, J., Partonen, T., Kieseppä, T., Paunio, T., Boks, M., Kahn, R., Ophoff, R.A., Bearden, C.E., Loohuis, L.O., Teshiba, T., deGeorge, D, Bilder, R.M. (2020). Extensions of Multiple-Group Item Response Theory Alignment: Application to Psychiatric Phenotypes in an International Genomics Consortium. *Educational and Psychological Measurement*, 80(5), 870-909. doi:10.1177/0013164419897307

Bilder, R.M., Postal, K.S., Barisa, M., Aase, D.M., Cullum, C.M., Gillaspy, S.R., Harder L, Kanter G., Lanca M., Lechuga D.M., Morgan J.M., Most R., Puente A. E., Salinas C.M., Woodhouse J. (2020). Inter Organizational Practice Committee Recommendations/Guidance for Teleneuropsychology in Response to the COVID-19 Pandemic. *Archives of Clinical Neuropsychology*, 35(6), 647-659. doi:10.1093/arclin/acaa046

Postal K.S., Bilder R.M., Lanca M., Aase D.M., Barisa M., Holland A.A., Lacritz L., Lechuga D.M., McPherson S., Morgan J., Salinas C. Inter Organizational Practice Committee Guidance/Recommendation for Models of Care During the Novel Coronavirus Pandemic. (2020). Archives of Clinical Neuropsychology : *The Official Journal of the National Academy of Neuropsychologists*. PubMed PMID: 32997103; PubMed Central PMCID: PMC7543271; DOI: 10.1093/arclin/acaa073.

Loring, D.W. , Bauer, R.M., Cavanagh, L., Drane, D.L., Enriquez, K.D., Reise, S.P., Shih, K., Umfleet, L., Wahlstrom, D., Whelan, F., Widaman, K.F., Bilder, R.M. (in press). Rationale and Design of the National Neuropsychology Network. *Journal of the International Neuropsychological Society*.

Presentations:

Marcopulos, BM, and Bilder, RM (2019, June). Workshop: 11. Do we need to Modernize our Neuropsychological Assessment Methods? Annual Meeting of the American Academy of Clinical Neuropsychology, Chicago, IL.

Bauer, R. M., Bilder, R.M., Drane, D.L., Holdnack, J. Loring, D., Sabsevitz, D., Wahlstrom, D. (2019, June 21) National Neuropsychology Network [Conference presentation]. AACN Disruptive Technology Initiative, Chicago, IL, United States.

Bilder, RM (2019, August). "Omics" in Neuropsychology: Current State and Future Directions. Invited address, American Psychological Association Annual Meeting, Chicago, IL.

Bilder, RM (2019, December). NavNeuro Podcast: Episode 33 Neuropsychology 3.0 – With Dr. Bob Bilder, https://www.navneuro.com/33-neuropsychology-3-0-with-dr-bob-bilder/ (accessed 12/10/2019).

Bauer, R.M. (2020, February 6) Toward Precision Neuropsychology [Conference presentation]. INS 2020, Denver, CO, United States.

Bilder, R.M. (2020, February 6) Modeling Across Levels of Analysis for Precision Neuropsychology [Conference presentation]. INS 2020, Denver, CO, United States.

Cavanagh, L. (2020, February 6) Common Data Elements for Precision Neuropsychology [Conference presentation]. INS 2020, Denver, CO, United States.

Drane, D.L. & Loring, D. (2020, February 6) Precision Neuropsychological Assessment and Treatment in the Neurosurgical Context [Conference presentation]. INS 2020, Denver, CO, United States.

Umfleet, L. (2020, February 6) Modern Psychometric Strategies for Precision Neuropsychology [Conference presentation]. INS 2020, Denver, CO, United States.

Reise, S.R., Widaman, K., Bauer, R.M., Draine, D.L., Loring, D., Umfleet, L., Wahlstrom, D., Enriquez, K.D, Wong, E., Hubbard, A., & Bilder, R.M. (2021, January) Item Response Theory Analyses of Matrix Reasoning: Towards a New Short Form or Adaptive Test? [Conference poster]. INS 2021.