



*BABY SIBLINGS  
RESEARCH CONSORTIUM  
2009 ANNUAL REPORT*



**AUTISM SPEAKS™**

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# Executive Summary

1. The Committee of Principal Investigators of the BSRC now includes 23 members.
2. A new group of individuals agreed to serve on the External Advisory Committee.
3. Over 2100 siblings at risk for ASD have enrolled in BSRC projects; in the coming year we expect to enroll more than 800 additional high risk infants.
4. The BSRC published a high-profile paper in the May 2009 issue of *Pediatrics* – disseminating initial findings from BSRC research to the clinical community.
5. In 2009 22 papers were published in peer-review journals on topics directly relevant to the mission of the BSRC. In addition, members of the BSRC gave 93 presentations at professional conferences.
6. BSRC research programs involved 36 doctoral students and 6 post-doctoral fellows.
7. 14 new grants were awarded to members of the BSRC in 2009 to support further research on high risk infants.
8. Work on all ongoing collaborative projects and network projects is proceeding with the expectation that several will reach completion in the coming year.



## Baby Sibling Research Consortium (BSRC) - Mission

The BSRC focuses on investigations of infants at risk for autism spectrum disorders (ASD) using a variety of methods, including behavioral and neurobiological measures. The organization respects the integrity of the individual researchers and research groups while at the same time creating a framework for collaborative research activities (with new or existing funding at each site) and data sharing through this new entity. We have agreed to identify new pool our data for collaborative projects, thereby considerably enhancing the prospects of achieving our research goals.



## Members of the BSRC

The organization is made up of a Committee of Principal Investigators (CPI) representing major research groups participating in the BSRC. Each member of the BSRC is a PI on a funded project investigating infants/toddlers at risk for ASD.

### *Committee of Principal Investigators*

Susan Bryson, Ph.D.	Dalhousie University, Halifax, Canada
Alice Carter, Ph.D.	University of Massachusetts, Boston
Leslie Carver, Ph.D.	UCSD
Kasia Chawarska, Ph.D.	Yale University
John Constantino, M.D.	Washington University
Suzanne Curtin, Ph.D.	University of Calgary
Karen Dobkins, Ph.D.	UCSD
Deborah Fein, Ph.D.	University of Connecticut
Jana Iverson, Ph.D.	University of Pittsburgh
Ami Klin, Ph.D.	Yale University
Rebecca Landa, Ph.D.	Kennedy Krieger Institute
Catherine Lord, Ph.D.	University of Michigan
Daniel Messinger, Ph.D.	University of Miami
Sally Ozonoff, Ph.D.	MIND Institute, UC Davis
Joseph Piven, M.D.	University of North Carolina
Sally Rogers, Ph.D.	MIND Institute, UC Davis
Marian Sigman, Ph.D.	UCLA
Wendy Stone, Ph.D.	Vanderbilt University
Mark Strauss, Ph.D.	University of Pittsburgh
Helen Tager-Flusberg, Ph.D.	Boston University
Sara Webb, Ph.D.	University of Washington
Nurit Yirmiya, Ph.D.	Hebrew University, Jerusalem Israel
Lonnie Zwaigenbaum, M.D.	University of Alberta, Edmonton, Canada



### *Autism Speaks Project Staff*

Geraldine Dawson, Ph.D.  
Alycia Halladay, Ph.D.  
Andy Shih, Ph.D.

### *NIH Project Staff*

NICHHD: Alice Kau, Ph.D.



### *External Advisory Committee*

The following individuals graciously served on the External Advisory Committee in 2009:



Heidi Feldman, M.D. (Stanford University)  
Alan Fogel, Ph.D. (University of Utah)  
Nathan Fox, Ph.D. (University of Maryland)  
Peter Mundy Ph.D. (UC Davis/MIND Institute) – continuing member  
Alison Singer (Autism Science Foundation and parent)  
Ezra Susser, M.D. (Columbia University)



### **BSRC Officers: Executive Committee**

The BSRC Executive Committee is responsible for organizing and coordinating all functions of the BSRC. Current officers (for 2009-10) include:

Chair	Sally Ozonoff
Past-Chair	Lonnie Zwaigenbaum
Member	Helen Tager-Flusberg
Member	Rebecca Landa

### **Participants in BSRC Projects**

There are currently over 2100 siblings at risk for ASD enrolled and participating in active projects. In addition, almost 1200 infants from “low risk” or non-affected families are included in BSRC studies.

In the coming year, we expect to enroll an additional 845 siblings.

### **Annual Meeting Summary**

The BSRC held its annual meeting in Miami, Florida on January 28<sup>th</sup> and 29<sup>th</sup> 2009. The meeting focused on two major topics: (1) the “broader autism phenotype” – the milder or subclinical expression of certain features of ASD that may emerge in infants at risk who do not meet criteria for ASD and (2) regression



in infants with an older sibling affected with autism. Investigators provided new data and discussed novel approaches to these topics that were based on their studies that track the development of high risk infant siblings throughout early life.

Broader Autism Phenotype: Investigators at the BSRC meeting updated the group on new research studying autism in family members and reported that siblings who don't meet criteria for ASD may demonstrate difficulties in the areas of social interaction and language, as well as subtle behavioral or biological differences including increased head circumference, emerging in the latter half of the first year, eye tracking differences to faces, and changes in brain waves (measured as electroencephalographic, or EEG, activity). It is important that these differences can be understood and recognized so that a child needing help can get treatment as soon as possible. Might want to say that these features may also provide informative data for genetic studies and for finding etiologies.

Regression: The BSRC members discussed the challenges in defining regression, which, according to the literature and clinical reports can vary from an abrupt and dramatic loss of skills in one or more domains, to a more gradual loss of only a subset of skills. Data obtained by prospectively studying infants at-risk for developing autism offers a unique and detailed look at early signs and different patterns of onset of symptoms in ASD. For example, prospective longitudinal studies are documenting that the patterns of onset of autism are quite variable, ranging from early signs of symptoms during the first year of life, to observations of a plateau in development during the second year, to loss of skills that were previously observed (e.g., loss of social responsiveness). These variable patterns of onset underscore the challenges of developing reliable methods for early detection that are able to capture all children at-risk for ASD, and in defining the construct of regression. Despite the challenges, the investigators agreed that by defining and studying regression, it may be possible to discover whether different patterns of ASD are associated with different causes, prognoses, or treatment responses

## Paper Published in the Journal *Pediatrics*

Under the leadership of Lonnie Zwaigenbaum, members of the BSRC worked collaboratively on a highly significant paper published in the May, 2009 issue of the journal *Pediatrics*. This paper titled: “*Clinical assessment and management of toddlers with suspected autism spectrum disorder: Insights from studies of high-risk infants*” is the first paper to disseminate findings from the BSRC to the wider clinical community.

This publication was highlighted in the report published by the Interagency Autism Coordinating Committee 2009 *Summary of Advances in Autism Spectrum Disorder Research*.





Lonnie Zwaigenbaum, MD, Associate Director, Department of Pediatrics at the University of Alberta and author on the BSRC paper published in *Pediatrics*



## Three major findings in high-risk infant research based on published research in 2009

1. Parental concerns are useful predictors of diagnostic outcome at and after 12 months of age. This study validates the importance of parental reports on problems detected in infants' development. (Ozonoff et al., *Journal of Developmental and Behavioral Pediatrics*, 2009).
2. At 10 months, high-risk infants show atypical event-related EEG responses (ERP) to pictures of faces and objects. Specifically, they show the same responses to faces as low risk infants, but *faster* responses to objects. At the same time, high-risk infants, show a *lack* of lateralization for any ERP component, in contrast to low risk infants. These findings point the way to a potential early biomarker that distinguishes high and low risk infants, but it is not yet known how well these biomarkers predict a later ASD diagnosis. (McCleery et al., *Biological Psychiatry*, 2009).
3. In the toddler and preschool years more than one-third of high risk siblings who do not develop ASD nevertheless have delays in the acquisition of language. Some of these children catch up during the early school years, while others remain language-impaired. (Gamliel et al., *Journal of Autism and Developmental Disorders* 2009).





An infant from Helen Tager-Flusberg's research program wearing the "cap" to collect electrophysiological data while looking at faces or listening to speech



## Publications in 2009

This section of the report presents a summary of the papers and book chapters published in 2009 by members of the CPI on topics directly related to their research on infants/toddlers at risk for ASD.

[\*\* Indicates more than one CPI member as co-author]

### **Susan Bryson, Dalhousie University**

Charman, T., Pickles, A., Chandler, S., Wing, L., Bryson, S., Simonoff, E. et al. (2009). Commentary: Effects of diagnostic thresholds and research vs. service and administrative diagnosis on autism prevalence. *International Journal of Epidemiology*, 38, 1234-1238.

\*\*Garon, N., Bryson, S., Zwaigenbaum, L., Smith, I., Brian, J., Roberts, W., & Szatmari, P. (2009). Temperament and its relationship to autistic symptoms in a high-risk infant sibling cohort. *Journal of Abnormal Child Psychology*, 37, 59-78.

Volden, J, Coolican, J., Garon, N., White, J., & Bryson, S. (2009) Pragmatic language in autism spectrum disorder: Relationships to measures of ability and disability. *Journal of Autism and Developmental Disorders*, 39: 388-393.

### **John Constantino, Washington University**

Virkud YV, Todd RD, Abbacchi AM, Zhang Y, Constantino JN. (2009). Familial aggregation of quantitative autistic traits in multiplex versus simplex autism. *American Journal of Medical Genetics B: Neuropsychiatric Genetics*, 328-34.



**Karen Dobkins, University of California at San Diego**

McCleery JP, Akshoomoff N, Dobkins KR & Carver LJ. (2009). Atypical face vs. object processing and hemispheric asymmetries in 10-Month-Old infants at risk for autism. *Biological Psychiatry*, 66, 950-957.

**Deborah Fein, University of Connecticut**

Mraz, K.D., Dixon, J., Dumont-Mathieu, T., Fein, D. (2009) Accelerated Head and Body Growth in Infants Later Diagnosed with Autism Spectrum Disorders: A Comparative Study of Optimal Outcome Children. *Journal of Child Neurology*, 24, 833-845.



Esser, E., Suter, S. and Fein, D. (2009) Autism: Genes, anatomy, and behavioral outcome. In Barnes, M. (ed): *Genes, Brain and Development* Cambridge U. Press, pp. 19-52.



**Ami Klin, Yale University**

Jones, W., & Klin, A. (2009). Heterogeneity and homogeneity across the autism spectrum: the role of development. *Journal of the American Academy of Child and Adolescent Psychiatry*, 48, 471-473.



**Daniel Messinger, University of Miami**

Parlade, M. V., Messinger, D. S., van Hecke, A., Kaiser, M., Delgado, C., & Mundy, P. (2009). Anticipatory Smiling: Linking Early Affective Communication and Social Outcome. *Infant Behavior & Development*, 32, 33-43.

**Sally Ozonoff, University of California at Davis**

\*\*Ozonoff, S., Young, G.S., Steinfeld, M.B., Hill, M.M., Cook, I., Hutman, T., Macari, S., Rogers, S.J., & Sigman, M. (2009). How early do parent concerns predict later autism diagnosis? *Journal of Developmental and Behavioral Pediatrics*, 30, 367-375

Wang, K., et al. [53 authors, including Ozonoff, S.]. (2009). Common genetic variation in the intergenic region between CDH10 and CDH9 is associated with susceptibility to autism spectrum disorders. *Nature*, 459, 528-533.

Young, G.S., Merin, N., Rogers, S.J., & Ozonoff, S. (2009). Gaze behavior and affect at 6 months: Predicting clinical outcomes and language development in typically developing infants and infants at risk for autism. *Developmental Science*, 12, 798-814.



### **Wendy Stone, Vanderbilt University**

Malow, B.A., Crowe, C., Henderson, L., McGrew, S., Wand, L., Song, Y., & Stone, W.L. (2009). A sleep habits questionnaire for children with autism spectrum disorders. *Journal of Child Neurology*, 24, 19-24.

Key, A.P.F., Stone, W.L., & Williams, S.M. (2009). What do infants see in faces? ERP evidence of different roles of eye and mouth processing in 9-month-old infants. *Infant and Child Development*, 18, 149-162.

Yoder, P.J., Stone, W.L., Walden, T.A., & Malesa, E.E. (2009). Predicting social impairment in younger siblings of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 39, 1381-1391.



Hudenko, W.J., Stone, W.L., & Bachorowski, J. (2009). Laughter differs in children with autism: An acoustic analysis of laughs produced by children with and without the disorder. *Journal of Autism and Developmental Disorders*, 39, 1392-1400.



### **Helen Tager-Flusberg, Boston University**

Kuban, K., O'Shea, M., Allred, E., Tager-Flusberg, H., Goldstein, D.J., & Leviton, A. (2009) Positive screening on the Modified-Checklist for Autism in Toddlers (M-CHAT) in extremely low gestational age newborns. *The Journal of Pediatrics*, 154, 535-540.



\*\* Tager-Flusberg, H., Rogers, S., Cooper, J., Landa, R., Lord, C., Paul, R., Rice, M., Stoel-Gammon, C., Wetherby, A., & Yoder, P. (2009). Defining spoken language benchmarks and selecting measures of expressive language development for young children with autism spectrum disorders. *Journal of Speech, Language, and Hearing Research*, 52, 643-652.

### **Sara Jane Webb, University of Washington**

Webb, S.J., & Jones, E. (2009). Early identification of autism: Early characteristics, onset of symptoms, and diagnostic stability. *Infants and Young Children*.

### **Nurit Yirmiya, Hebrew University**

Gamliel, I., Yirmiya, N., Jaffe, D. H., Manor, O., & Sigman, M. (2009). Developmental trajectories in siblings of children with autism: cognition and language from 4 months to 7 years. *Journal of Autism and Developmental Disorders*, 39, 1131-44.



## Lonnie Zwaigenbaum, University of Alberta

\*\*Zwaigenbaum, L., Bryson, S., Lord, C., Rogers, S., Carter, A., Carver, L., Chawarska, K., Constantino, J., Dawson, G., Dobkins, K., Fein, D., Iverson, J., Klin, A., Landa, R., Messinger, D., Ozonoff, S., Sigman, M., Stone, W., Tager-Flusberg, H., & Yirmiya, N. (2009). Clinical assessment and management of toddlers with suspected ASD: Insights from studies of high-risk infants. *Pediatrics*, 123, 1383-1391.

\*\*Garon N, Bryson SE, Zwaigenbaum L, Smith IM, Brian J, Roberts W, Szatmari P. Temperament and its relationship to autistic symptoms in a high-risk infant sib cohort. *Journal of Abnormal Child Psychology*. 37, 59-78.



## Conference Presentations in 2009



[\*\* Indicates more than one CPI member as co-presenter]

### Susan Bryson, Dalhousie University



Bryson, S.E. Overview of research on autism. IWK Centennial Conference: *Advances in the Science and Treatment of Autism*, Halifax, NS.



Bryson, S.E. Community-based early intervention for young children with autism: Challenges and opportunities. *Keynote address at Sick Kids Child Development Update*, Toronto, ON.

Bryson, S.E. ASD: What do we know, where are we going, and what matters? *Keynote address at the Annual General Meeting of Autism Ontario*, Toronto, ON.

\*\*J. Brian, J., Smith, I. M., McCormick, T., Dowds, E., Sauve, C., Smith, K., Ostfield, D., Zwaigenbaum, L., Roberts, W., & Bryson, S. E. Social ABCs for toddlers with autism: *Evaluation of a parent-mediated intervention*. Poster presented at International Meeting for Autism Research (IMFAR) Chicago, IL.

\*\*Thompson, A., Szatmari, P., Bryson, S.E., Fombonne, E., Mirenda, P., Roberts, W., Smith, I.M., Vaillancourt, T., Volden, J., Waddell, C., Zwaigenbaum, L., Georgiades, S., Duku, E., & Pathways in ASD Study Team. *Comparison of diagnostic classification between the WPS and Revised ADOS Modules*. Paper presented at International Meeting for Autism Research (IMFAR) 2009, Chicago, IL.



### **Kasia Chawarska, Yale University**

\*\*Chawarska, K., Shic, F., Bradshaw, J., Macari, S. & Klin, A. *Scanning strategies of static, dynamic, and speaking faces in 3, 6, 9, and 12-month-old infants with and without developmental disabilities.* International Meeting for Autism Research, Chicago, IL.

Macari, S., Bearss, K., Gengoux, G., & Chawarska, K. *Early social-communication skills in 12-month-olds at high risk for autism spectrum disorder.* Society for Research in Child Development, Denver, CO.

Macari, S., Bearss, K., Gengoux, G., & Chawarska, K. *Infants at high risk for autism spectrum disorder: Social-communication and language skills at 12 months.* International Meeting for Autism Research, Chicago, IL.

\*\*Paul, R., Klin, A., & Chawarska, K. *Prelinguistic Vocal Behavior in Infants Siblings of Children with ASD.* International Meeting for Autism Research, Chicago, IL.



Reed, J., Simeone, D., Macari, M., Butler, B., & Chawarska, K. *Attention regulation and affective engagement in infants with siblings on the autism spectrum during social orienting probes.* Society for Research in Child Development, Denver, CO.

Simeone, D., Reed, J., Macari, S., Butler, B., Chawarska, K. *Attention to speech and song at six months and later language abilities in siblings of children with Autism Spectrum Disorders.* Society for Research in Child Development, Denver, CO.

### **Suzanne Curtin, University of Calgary**

Droucker, D., Curtin, S., Leew, S., & Vouloumanos, A. *Preferences for Infant-Directed Speech in Infants at Risk for Autism Spectrum Disorder.* Society for Research in Child Development, Denver, CO.

### **Karen Dobkins, UCSD**

\*\*Dobkins KR, Sampath V and Carver LJ. *Face/Object Perception in Infant Siblings of Children with Autism Spectrum Disorders (ASD).* International Meeting for Autism Research, Chicago, IL.

### **Deborah Fein, University of Connecticut**

Swensen, L., Fein, D., Naigles, L. *Patterns of Change in Children With Autism Compared to Typically Developing Children.* Society for Research in Child Development, Denver, CO.



Chlebowksi, C.(G) Barton, M., Hodgson, S., Fein, D. *Diagnostic Stability of Autism Spectrum Disorder Diagnoses Made Before Age Two*. International Meeting for Autism Research, May, Chicago, IL.

Swensen, L., Fein, D. Naigles, L. *Patterns of Changes in Development in Children with Autism Compared to Typically Developing Children*. International Meeting for Autism Research, May, Chicago, IL.

Pandey, J., Carr, K., Verbalis, A., Barton, M., Fein, D. *Phenotypic Congruence in Multiplex Autism Families*. International Meeting for Autism Research, May, Chicago, IL.

Boorstein, H., Verbalis, A., Barton, M., Hodgson, S., Fein, D. *Diagnostic Stability and Outcome of Toddlers with Significant Cognitive Delays and ASD Symptoms*. International Meeting for Autism Research, May, Chicago, IL.



Verbalis, A., Boorstein, H., Pandey, J., Hodgson, S., Dumont-Mathieu, T., Barton, M., Green, J., Fein, D. *Longitudinal Changes in Cognitive Ability in Male and Female Children with ASD*. International Meeting for Autism Research, May, Chicago, IL.



Jara, S., Tek., D., Jaffery, G., Fein, D., Naigles, L. *Joint Attention in Young Children with Autism*. International Meeting for Autism Research, May, Chicago, IL.



**Jana Iverson, University of Pittsburgh**

Iverson, J.M., Paradé, M.V., Winder, B.M., & Wozniak, R.H. *Early Development of the Gesture-Speech System in Infants at Risk for ASD*. Society for Research in Child Development, Denver, CO.

Jakubowski, K., Thatcher, A., & Iverson, J.M. *Rhythmic Motor Activity in Infants at Risk for Autism Spectrum Disorders*. Society for Research in Child Development, Denver, CO.

Koterba, E.A., Rose, M., & Iverson, J.M. *Object Exploration at 6 and 9 Months: Differences between Infants With and Without Risk for Autism*. Society for Research in Child Development, Denver, CO.

Mugno, B.L., Wozniak, R.H., & Iverson, J.M. *Emotional Expression and Gaze Behavior in Infants at Heightened Risk for Autism*. Society for Research in Child Development, Denver, CO.



Parladé, M.V. & Iverson, J.M. *The Temporal Coordination of Communicative Behaviors in 12-Month-Old Infants at Risk for Autism Spectrum Disorders*. Society for Research in Child Development, Denver, CO.

Sheinkopf, S.J., Iverson, J.M., & Lester, B.M. *Atypical Acoustic Features of Elicited and Non-elicited Cries in Infants Later Diagnosed with Autism*. Society for Research in Child Development, Denver, CO.

Winder, B.M., Poulos-Hopkins, S., Iverson, J.M., & Wozniak, R.H. *Spontaneous Vocal and Gestural Communication in Infants at Heightened Risk for Autism*. Society for Research in Child Development, Denver, CO.

Jakubowski, K. & Iverson, J.M. *Look at Mommy: Attention-Related Communication in Mothers of Children at Risk for Autism*. International Meeting for Autism Research, Chicago, IL.

Johnson, J., Koterba, E., Parladé, M.V., & Iverson, J.M. *The Effects of Parental Stress on the Emergence and Development of Joint Attention Behaviors in Infant Siblings of Children with Autism*. International Meeting for Autism Research, Chicago, IL.



Winder, B.M., Poulos-Hopkins, S., Parladé, M.V., Wozniak, R.H., & Iverson, J.M. *A Longitudinal Study of the Spontaneous Initiation of Vocal and Gestural Communication in Infants at Heightened Risk for Autism*. International Meeting for Autism Research, Chicago, IL.



### **Ami Klin, Yale University**



Klin, A. *Autism as a neurodevelopmental disorder of social engagement: new research and implications for assessment*. American Academy of Child and Adolescent Psychiatry, Hawaii



Klin, A. *Perception of audiovisual synchrony under varying degrees of social context in infants with autism*. International Meeting for Autism Research, Chicago, IL

Klin, A. *Perception of physical and social contingencies in infants with autism*. International Meeting for Autism Research, Chicago, IL

Klin, A. *Altered face scanning and impaired recognition of biological motion in 2-year-olds with autism*. International Meeting for Autism Research, Chicago, IL

Klin, A. *Where it all begins: Studies of social engagement in infants and toddlers*. II Congreso Internacional Síndrome de Asperger, Sevilla, Spain,



**Rebecca Landa, Kennedy Krieger Institute**

Landa, R. Rao P, Hess C, *Parent report of psychopathology and social functioning in younger siblings of children with autism.* Society for Research in Child Development, Denver, CO.

Landa, R. Bhat A, Wong C, Galloway JC, *A comparison of reaching coordination and arm postures between infant siblings of children with autism and typically developing infants at 3 and 6 months of age.* International Meeting for Autism Research ,Chicago IL.

Landa, R. Bhat A, Downing K, Galloway JC. *A comparison of object exploration strategies between infant siblings of children with autism and typically developing infants at 6 months of age.* International Meeting for Autism Research, Chicago, IL

Landa, R. *Outcomes of two-year-olds enrolled in a comprehensive developmental intervention.* International Meeting for Autism Research, Chicago, IL

Landa, R. & Stuart E. *Developmental trajectory in ASD and broader autism phenotype in the first three years of life.* International Meeting for Autism Research Chicago IL.

Landa, R. *The early achievements model of intervention for young children with ASD.* Elwyn, Inc, Philadelphia, PA

Landa, R. *Transition in the early years: Early screening, identification, and intervention.* CSATC Annual Autism Conference, Indianapolis, IN.

Bhat, A., Galloway, J. C., Landa, R. J. "Fine-motor and gross-motor delays in infants at risk for autism in the first half year of life", American Physical therapy Association, Combined Sections Meeting, Las Vegas, NV

Bhat, A., Wong, C., Galloway, J. C., Landa, R. J. "A Comparison of Reaching Coordination and Arm Postures Between Infant Siblings of Children with Autism and Typically Developing Infants at 3 and 6 Months of Age", International Meeting For Autism Research, Chicago, IL

Bhat, A., Downing, K., Galloway, J. C., Landa, R. J. "A Comparison of Object Exploration Strategies Between Infant Siblings of Children with Autism and Typically Developing Infants at 6 Months of Age", International Meeting For Autism Research, Chicago, IL

Hess CR, Rao P, Landa R, *Clinician vs Parent Ratings of Social Responsiveness, Communication, and Stereotypic Behavior in Siblings of Children with Autism.* Society for Research in Child Development, Denver, CO



**Daniel Messinger, University of Miami**

Messinger, D. *The Development of Autism in At-Risk Infants – Characterization and Amelioration*. Medical Issues and the Growing Child Conference. University of Miami, Miami FL.

Messinger, D. *The Development of Autism in At-Risk Infants – Characterization and Amelioration*. Medical Issues and the Growing Child Conference. University of Miami, Miami, FL.

Cadavid S, Mahoor MH, Messinger DS, Cohn JF. *Automated Classification of Gaze Direction Using Spectral Regression and Support Vector Machine*. International Conference on Affective Computing & Intelligent Interaction.

S. Cadavid, M. Abdel-Mottaleb, D. S. Messinger, M. H. Mahoor, & L. E. Bahrick, *Detecting local audio-visual synchrony in monologues utilizing vocal pitch and facial landmark trajectories*. British Machine Vision Conference (BMVC).

Baker, J. K., Haltigan, J.D., Brewster, R., Jaccard, J. & Messinger, D. *Non-Expert Ratings of Parent and Infant Emotion: Concordance with Expert Ratings and Relevance to Early Autism Risk*. Hot Topic International Society for Research in Emotions. Leuven, Belgium.

M. Mahoor, S. Cadavid, D. Messinger & J. Cohn *A Framework for Automated Measurement of the Intensity of Non-Posed Facial Action Units*. Second IEEE Workshop on CVPR for Human Communicative Behavior Analysis, Miami Beach, FL.

Grantz, C., Ibanez, L., Gealy, W., & Messinger, D. S. *Triadic Attention Development across Contexts in Infant Siblings of Children with Autism Spectrum Disorders*. International Meeting for Autism Research. Chicago, IL.

Messinger, D. *The roots of moral cognition: Interaction and empathy in infants at risk for autism*. Moral Cognition and Behavior: Philosophical and Neuroscientific Approach. STOQ III. Rome.

McDonald, N., Robinson, G., & Messinger, D. *Does 24-month empathic responding predict autistic symptomatology and later ASD diagnosis?* International Meeting for Autism Research, Chicago, IL.

Ibanez, L., Grantz, C., Gealy, W., Kimijima, M., & Messinger, D. *Developmental Associations Between Attention, Language, and ASD Symptomatology in the Infant Siblings of Children with Autism Spectrum Disorders(ASDs)*. International Meeting for Autism Research, Chicago, IL.



\*\*Nahmias, A. S., Brown, A. H., Stone, W. L., Yoder, P. J., Messinger, D. S., & Wetherby, A. M. *Repetitive and Stereotyped Movements in Young Children With and Without Later Autism Symptomatology*. Society for Research in Child Development, Denver, CO.

Haltigan, J. D., Seifer, R., Chan, S., & Messinger, D. *Parental Sensitivity and Attachment Security in Infants at Risk for Autism Spectrum Disorders (ASDs)*. Society for Research in Child Development, Denver, CO.

Ibanez, L., Grantz, C., Messinger, D., Gealy, W., & Kimijima, M. *Visual and Joint Attention and Later Language Development in the Infant Siblings of Children with an Autism Spectrum Disorder*. Society for Research in Child Development, Denver, CO.

McDonald, N. & Messinger, D. *Empathic responding in toddlers at risk for an autism spectrum disorder*. Society for Research in Child Development, Denver, CO.

Mahoor, M.H., Messinger, D.S., Ibanez, L.V., Cadavid, S., Cohn, J.F. *Automated Measurement of Gaze Direction in Infants*. Society for Research in Child Development, Denver, CO.



**Sally Ozonoff, UC Davis**



\*\*Ozonoff, S., Hill, M.M., Young, G.S., Cook, I.C., Sangha, S., Baguio, F., Rogers, S.J., Hutman, T.M., & Sigman, M.D. *Autism in infancy: Gaze and affect in the first years of life*. Society for Research in Child Development, Denver, CO.



\*\*Ozonoff, S., Cook, I. Hill, M.M., Hutman, T., Rogers, S.J., Sigman, M., Steinfeld, M.B., Macari, S., & Young, G.S.. *How early do parent concerns about development predict later autism diagnosis?* International Meeting for Autism Research, Chicago, IL.



\*\*Schwichtenberg, A.J., Ozonoff, S., Rogers, S.J., Steinfeld, M.B., Young, G.S., & Moore, M.. *Does family affectedness predict outcomes in infants at risk for autism?* International Meeting for Autism Research, Chicago, IL.

\*\*Young, G.S. Rogers, S.J., Sigman, M., Hutman, T., Mattson, W., Martinez, J., & Ozonoff, S.. *Longitudinal Rasch analysis of imitation in infants at risk for autism*. International Meeting for Autism Research, Chicago, IL.

\*\*Wetherby, A.M., Lord, C., Woods, J., Guthrie, W., Pierce, K., Shumway, S., Thurm, A., & Ozonoff, S.. *The Early Screening for Autism and Communication Disorders (ESAC): Preliminary field-testing of an autism-specific screening tool for children 12 to 36 months of age*. International Meeting for Autism Research, Chicago, IL.



**Marian Sigman, UCLA**

Barnwell, J.M., Hutman, T., DeLaurentiis, A.D., Rozga, A., Sugar, C., & Sigman, M., *Impairment in Empathic Response Is Evident by 12 Months of Age in Children Subsequently Diagnosed with ASD*. International Meeting for Autism Research, Chicago, IL.

Christensen, L., Rozga, A., Hutman, T., Young, G.S., Ozonoff, S., Rogers, S.J., & Sigman, M., *Play Trajectories in Infant Siblings of Children with Autism*, Gatlinburg Conference on Research & Theory in Intellectual & Developmental Disabilities, New Orleans, LA.

\*\*Del Rosario, M., Hutman, T., Young, G.S., Rogers, S.J., Ozonoff, S., & Sigman, M., *Temperament Profiles of Infants Subsequently Diagnosed with ASD*. International Meeting for Autism Research, Chicago, IL.

Gillespie-Lynch, K., Hutman, T., Sigman, M., Gaither, S., & Johnson, S.P., *How do infant siblings of autistic children and typically developing infants learn to share attention?* EyeTrac Kids II. Davis, CA.



Gomez, L., Hutman, T., & Sigman, M., *Predictors of Daily Living Skills in Children with Autism Spectrum Disorder*. International Meeting for Autism Research, Chicago, IL.



Huang, Y.T., Hutman, T., & Sigman, M., *The sharing of positive affect by 12-month-old infants at risk for autism spectrum disorders*, Stanford University Undergraduate Research Conference, Stanford, CA.



**Wendy Stone, Vanderbilt University**

Malesa, E.E., Yoder, P.J., Stone, W.L., McLean, L.E., Foss-Feig, J.H., & Walden, T.A. *The relative salience of pointing and labeling cues for responding to joint attention in children at high risk for ASD*. Society for Research in Child Development, Denver, CO.

Malesa, E.E. & Stone, W.L. *Characterization of the early presentation of the broad autism phenotype*. International Meeting for Autism Research, Chicago, IL.

Lee, E.B. & Stone, W.L. *Defining social engagement deficits in young children with ASD: Similarities between retrospective and prospective parental reports*. International Meeting for Autism Research, Chicago, IL.



## **Helen Tager-Flusberg, Boston University**

Tager-Flusberg, H. *Early developmental pathways in infants at risk for ASD or SLI*. Conference on Language and Social Understanding in Developmental Disorders, Manchester, England.

Augenstein, T., Vogel-Farley, V., Casner, L., Kasparian, L., Nelson, C.A., & Tager-Flusberg, H. *Electrophysiological investigation of auditory processing in infants at risk for autism spectrum disorders or language impairment*. . International Meeting for Autism Research, Chicago, IL.

Vogel-Farley, Augenstein, T., Nelson, C.A., Tager-Flusberg, H., Casner, L. & Kasparian, L. *electrophysiological investigation of the processing of visual stimuli in infants at risk for autism spectrum disorders*. . International Meeting for Autism Research, Chicago, IL.

\*\*Tsai, Y., Kasparian, L., Csnwer, L., Carter, A. & Tager-Flusberg, H. *Use of written diaries in tracking language development in infants at risk for autism spectrum disorders*. . International Meeting for Autism Research, Chicago, IL.

## **Sara Jane Webb, University of Washington**

Davies, A., Venema, K., Jones, E., & Webb, S.J. *Facial processing and habituation in toddlers with autism spectrum disorders*. Mary Gates Symposium, Seattle WA.

Freed, N., Venema, K., Jones, E., & Webb, S.J. *Child EEG and maternal depression*. Mary Gates Symposium, Seattle WA.

Jones, E.J.H., Freed, N., Merkle, K., Greenson, J., Murias, M., Dawson, G., & Webb, S.J. *ERP Responses to Faces are Correlated with Verbal Skills in Toddlers with ASD*. International Meeting for Autism Research, Chicago, IL.

Lowry, R., Venema, K., Jones, E., & Webb, S.J. *Variability and self-regulation in infants at risk for ASD*. Mary Gates Symposium, Seattle WA.

Shapley, J., Venema, K., Jones, E., & Webb, S.J. *Attention and emotional responses to social and non-social stimuli in infants at high risk for autistic spectrum disorders*. Mary Gates Symposium, Seattle WA.

Venema, K., Jones, E.J.H., Glead, A., Elsabbagh, M., Johnson, M., Estes, A., Dawson, G., & Webb, S.J. *Assessing visual attention in 6-month-old infants with increased ASD risk: The question of variability*. International Meeting for Autism Research, Chicago, IL.



**Lonnie Zwaigenbaum, University of Alberta**

Kuwaik GA, Roberts W, Brian J, Bryson S, MacKinnon Modi B, Smith IM, Szatmari P, Tanel N, Zwaigenbaum L. *Immunization Uptake in Siblings of Children with Autism*. Canadian Pediatric Society Ottawa, Ontario. June 23-27,

\*\*Zwaigenbaum L, Bryson SE, Smith I, Brian J, Roberts W, Szatmari P, Vaillancourt T, Roncadin C. *A Comparison of Prospective and Retrospective Measures of Early Language Regression in Children with Autism from a High-Risk Infant Cohort*. Canadian Pediatric Society Ottawa, Ontario.

\*\*Roberts W, Kuwaik GA, Brian J, Bryson SE, MacKinnon Modi B, Smith M, Szatmari P, Tanel N, Zwaigenbaum L. *Immunization Uptake in Siblings of Children with Autism*. International Meeting for Autism Research, Chicago, IL.

\*\*Brian J, Smith IM, McCormick T, Dowds E, Sauve C, Smith K, Ostfield D, Zwaigenbaum L, Roberts W, Bryson SE. *Social ABCs for Toddlers with Autism: Evaluation of a Parent-Mediated Intervention*. International Meeting for Autism Research, Chicago, IL.

\*\*Baranek GT, Zwaigenbaum L, Brian J, Bryson SE, Crais E, Piven J, Reznick JS, Roberts W, Smith IM, Szatmari P, Watson L. *Screening with the First Year Inventory at 12 Months of Age and Diagnostic Outcomes at Two Years in a High-Risk Sample of "Infant Sibs"*. International Meeting for Autism Research, Chicago, IL.

\*\*Zwaigenbaum L, Bryson S, Brian J, Smith IM, Roberts W, Szatmari P, Roncadin C, Vaillancourt T. *Comparing Prospective and Retrospective Measures of Early Language Regression in Children with Autism from a High-Risk Infant Cohort*. International Meeting for Autism Research, Chicago, IL.

\*\*Garon N, Brian J, Roberts W, Smith IM, Szatmari P, Zwaigenbaum L, Bryson SE. *Differential Early Temperament Trajectories in Children at High Risk of Developing Autistic Spectrum Disorder*. International Meeting for Autism Research, Chicago, IL.

\*\*Mitchell SJ, Roncadin C, Brian JA, Roberts W, Smith IM, Szatmari P, Bryson SE, Zwaigenbaum L. *Parent-Reported Gesture Use in Infant Siblings Later Diagnosed with Autism Spectrum Disorders: A Follow-Up Study*. Society of Research in Child Development, Denver CO.

\*\*Hart Leef J, Brian JA, Bryson SE, Roberts W, Smith IM, Szatmari P, Zwaigenbaum L. *Receptive Behavior in Typically Developing Toddlers: Evidence from Direct Observation*. Society of Research in Child Development, Denver CO.



## Newly Funded Grants in 2009

### **Susan Bryson, Dalhousie University**

CIHR Fombonne and Bryson, PIs 2009-2015  
Autism Training Grant

### **Deborah Fein, University of Connecticut**

\*NICHD Fein, PI 2009-2014  
Early Detection of Pervasive Developmental Disorders

### **Jana Iverson, University of Pittsburgh**

Autism Speaks Parlade and Iverson, PIs 2009-2011  
Weatherstone Predoctoral Fellowship to Meghan Parlade



### **Daniel Messinger, University of Miami**

\*NICHD Messinger and Constantino, co PIs 2009-2011  
Autistic Traits: Life Course and Genetic Structure.



### **Sally Ozonoff, University of California at Davis**

NIMH Ozonoff, PI 2009-2013  
Infants at risk of autism: A longitudinal study



### **Wendy Stone, Vanderbilt University**

\*NICHD Fein – PI, Stone – Site PI 2009-2014  
Early Detection of Pervasive Developmental Disorders

### **Mark Strauss, University of Pittsburgh**

Autism Science Foundation Strauss, PI 2009-2010  
Doctoral Training Award to Sarah Hannigen  
Defining High and Low Risk Expression of Emotion in Infants At-Risk for  
Autism



**Helen Tager-Flusberg, Boston University**

NIDCD Tager-Flusberg & Nelson (PIs) 2009-2014  
Neurobehavioral Research on Infants at Risk for Autism or SLI

Simons Foundation Nelson & Tager-Flusberg (Co-PIs) 2009-2012  
Electrophysiological, Metabolic and Behavioral Markers of Infants at Risk for Autism

**Sara Jane Webb, University of Washington**

Washington State Legislative Initiative Webb, PI 2009  
Developmental Disabilities Project, Does atypical head growth predict autism symptoms and severity?

Washington State Legislative Initiative Webb, PI 2009  
Developmental Disabilities Project  
Electrophysiological risk markers in infant at risk for autism



**Nurit Yirmiya, Hebrew University**



Autism Speaks Ebstein PI, Yirmiya, co-PIs 2009-2012  
Effect of oxytocin receptor inhibitor (Atosiban) during the perinatal period and prevalence of autism spectrum disorders



Israel Science Foundation Yirmiya and Makuta, co-PIs 2009-2012  
Prenatal exposure to oxytocin or oxytocin-antagonist as a risk factor for autism spectrum disorders



The Israeli Ministry of Health Yirmiya, PI 2009-2011  
The development of younger siblings of children with autism now at 10 years of age

**Lonnie Zwaigenbaum, University of Alberta**

Network of Centres of Excellence in Brain Development  
Goldowitz (PI) and Zwaigenbaum (site PI) 2010-2014



# Doctoral and Post-Doctoral Training on BSRC Projects

The following graduate students and post-doctoral fellows were actively involved in the research programs directed by members of the CPI that focused on high risk infants.

## **Leslie Carver, UCSD**

Katherine Meltzoff – Doctoral student

## **Suzanne Curtin, University of Calgary**

Danielle Droucker -Doctoral student

## **Karen Dobkins, UCSD**

Pam Pallett, Ph.D. - Postdoctoral fellow

## **Deborah Fein, University of Connecticut**

Molly Helt – Doctoral student

Katelin Carr – Doctoral student

Hilary Boorstein – Doctoral student

Alyssa Verbalis – Doctoral student

Mike Rosenthal – Doctoral student

Colby Chlebowski – Doctoral student

Eva Troyb – Doctoral student

Kelley Knoch – Doctoral student

Alyssa Orinstein – Doctoral student

## **Jana Iverson, University of Pittsburgh**

Eve Sauer LeBarton - Postdoctoral fellow

Erin Koterba – Doctoral student

Nina Leezenbaum – Doctoral student

Meaghan Parladé – Doctoral student

## **Rebecca Landa, Kennedy Krieger Institute**

Annie Inge, PhD - Postdoctoral fellow

Natalie Rallis, - Doctoral student

Joanne Flanagan, – Doctoral student

Alden Gross, MPH graduate student

Allison O’Neill– Doctoral student

## **Sally Ozonoff, UC Davis**

Amy Jo Schwichtenberg - Postdoctoral fellow

## **Marian Sigman, UCLA**



Students, faculty and staff of the Landa Lab at the Kennedy Krieger Institute in Maryland

ismSpeaks.org



Ted Hutman, Postdoctoral fellow  
Kristen Gillespie-Lynch – Doctoral student  
Lisa Christensen – Doctoral student

**Wendy Stone, Vanderbilt University**

Jennifer Foss-Feig – Doctoral student  
Cara Damiano – Doctoral student  
Elizabeth Malesa – Doctoral student  
Elizabeth Catania – Doctoral student

**Mark Strauss, University of Pittsburgh**

Desiree Wilkinson – Doctoral student  
Sarah Hannigen – Doctoral student

**Helen Tager-Flusberg, Boston University**

Anne Seery – Doctoral student  
Meagan Thompson – Doctoral student



**Sara Jane Webb, University of Washington**

Praneeta Bremjit – MD Student  
Karen Burner – Doctoral student  
Emily Jones – Doctoral student



**Nurit Yirmya, Hebrew University**

Ifat Gamliel Seidman – Doctoral student  
Maya Yaari – Doctoral student  
Raaya Alon – Doctoral student  
Noa Ben Yitzhak – Doctoral student  
Shirley Mitelman – Doctoral student  
Ayelet Harel – Doctoral student



**Lonnie Zwaigenbaum, University of Alberta**

Shelley Mitchell – Doctoral student  
Nancy Garon -Postdoctoral fellow



## AS Toddler Treatment Network: Report Update

In January of 2009, the Toddler Treatment Network, met in San Diego, Calif. to discuss the goals, objectives and directions of the network, and to share preliminary analyses of data collected so far from these randomized trials. There are two major commonalities across the studies: (1) they are parent-implemented, and (2) they all involve naturalistic delivery of interventions addressing the earliest autism behavioral phenotype and thus are heavily focused on communication: joint attention, imitation, gestures and language. The projects use different intervention models, most of which involve adaptations of existing preschool interventions to make them more infant-appropriate. The intervention involve techniques that can be implemented outside the clinic, allowing parents and caregivers to use these techniques in different settings, decreasing the time between parent's initial concern and beginning intervention, thus hopefully improving developmental outcome in the long run. Because they require less "in clinic" time, they may also be very cost effective. A summary of each of these projects can be found here:

[http://www.autismspeaks.org/science/research/initiatives/toddler\\_treatment\\_network.php](http://www.autismspeaks.org/science/research/initiatives/toddler_treatment_network.php)

The overarching goals of the network are to a) improve measurement tools regarding outcomes for toddlers and their families, b) define or identify best practices for designing and implementing parent-delivered interventions, c) improve research designs and analytic approaches for early intervention studies, d) facilitate young researchers to develop productive programs of high quality treatment research and e) disseminate evidence of efficacy of early intervention with toddlers.

In 2009, the network collaborated on the creation of a demographic form that can be used for current and future studies. Such a tool will enable researchers to better identify variables across studies which might be used to identify factors which predict responsiveness to treatment. In addition, three junior investigators began developing the first network wide paper which will identify the challenges to determining efficacy of different early intervention paradigms, obstacles encountered, as well as practical solutions which were used to solve those obstacles. This paper is aimed to support other researchers in the area who are developing early intervention programs.

At the International Meeting for Autism Research in May, 2009, members of the TTN, their trainees, junior faculty and other collaborators presented over a dozen posters or oral presentations to attendees. The meeting was attended by over 1300 scientists, clinicians, researchers and members of the public. The conference organizers dedicated an afternoon of research presentations to the topic of early intervention. In addition, network participants delivered talks on novel screening approaches to early identification of autism, including the First Year Inventory and Systematic Observation of Red Flags. There was a special emphasis on



parent delivered interventions as well as utilization of parent observations. For example, the feasibility of delivering an intervention package using a tele-health program was examined.

Late in the year, the prestigious journal *Pediatrics* published evidence of the effectiveness of one of the intervention paradigms, the Early Start Denver Model. This study was co-authored by two network members, and was the first publication of a randomized control trial using a parent-delivered intervention for autism spectrum disorders. This work will continue and expand through the support of a larger project through NIH and Autism Speaks.

## Collaborative Projects (2009)



### **A: Prospective Study of Head Circumference in Infants at Risk for ASD**

Project Leader: Lonnie Zwaigenbaum

Steering committee: Lonnie Zwaigenbaum, Wendy Stone, Karen Dobkins, Rick Urbano, Warren Lambert



This was the first collaborative data project of the BSRC. Supplemental funds were provided by AS to set up the data management team and database at Vanderbilt University. The initial set of analyses have been completed, demonstrating atypical patterns of growth in head circumference toward the end of the first year of life, especially in those infants who later meet criteria for a diagnosis of autism. An abstract was presented at IMFAR 2008. An additional funding supplement has been awarded by AS to update the data to reflect current outcome status in participating high-risk and low-risk infants, finalize quality control, and conduct additional analyses. It is expected that a draft of a manuscript from this project will be completed and submitted for publication in 2010.



### **B: Gene Environment Contributions to Risk for Autism (GECRA)**

Project Leader: Lonnie Zwaigenbaum

In 2009 a grant was submitted to NIH to support the collection and analysis of DNA samples from a subset of the BSRC participating sites. The grant received favourable reviews however it was not funded. The BSRC is currently exploring other opportunities to obtain funding for collecting genetic data from our participating families.

### **C. Developmental Outcomes in Later-born Siblings of Children with ASD**

Project Leader: Sally Ozonoff

Project Working Group: Alice Carter, Daniel Messinger, Nurit Yirmiya, Greg Young, Lonnie Zwaigenbaum



At the December 2007 annual meeting, several BSRC sites presented data on developmental outcomes of siblings at risk. It was agreed that this topic would be the focus of a primary project for the Consortium. Data were collected from 11 sites that had outcome data at 36 months on at least a portion of their sample. Data from over 1000 infants were analyzed (n=664 high risk, n=338 low risk controls). 18.7% of high risk infants developed an ASD, while 2.5% of low risk infants did (odds ratio 8.89). In addition to risk group, male gender and multiplex family status were significant predictors of ASD outcome, with a three-fold increase in risk for male infants and an additional three-fold increase in risk if there was more than one older affected sibling. The gender of the older sibling did not have a significant influence on the rate of ASD outcomes, nor did the age of the infant at study enrollment or multiple demographic factors. These results suggest that sibling recurrence risk of ASD is higher than previous estimates suggested. The paper will be submitted for publication in June 2010.

## Goals for 2010

Based on discussions at the annual meeting held this year in January 2010 the following goals were set for the BSRC:

1. Revise Memorandum of Agreement for the BSRC.
2. Develop a set of common measures for the BSRC that would form the foundation of future collaborative studies.
3. Obtain funding for the BSRC database to house data on the common measures and to provide statistical support for primary and secondary projects. Initial implementation of the database should be underway before the end of 2010.
4. Explore funding options for the collection of genetic samples from BSRC participants.
5. Completion of papers summarizing the findings from two initial projects: head circumference and developmental outcomes.

## Acknowledgements

The BSRC wishes to acknowledge and gratefully thank families who participated and contributed to the infant sibling projects in the US, Canada and Israel.

The research conducted by members of the BSRC is largely supported by funds from Autism Speaks and the National Institutes of Health. We gratefully acknowledge the support of these and several other agencies and foundations for our individual research programs. We thank members of our External Advisory Board for their advice on our current programs.

