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# Preliminary Validation Of The Childhood Autism Rating Scale - Second Edition Questionnaire For Parents Or Caregivers (cars2-Qpc) And The Gilliam Autism Rating Scale (gars-2) With A Chinese-Speaking Population

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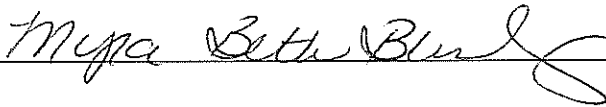
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PRELIMINARY VALIDATION  
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QUESTIONNAIRE FOR PARENTS OR CAREGIVERS (CARS2-QPC) AND THE  
GILLIAM AUTISM RATING SCALE (GARS-2)  
WITH A CHINESE-SPEAKING POPULATION

By

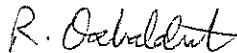
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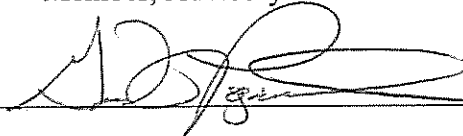
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By

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in partial fulfillment of the requirements

for the degree of

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## ABSTRACT

Autism is a neurobiological disorder that is diagnosed through careful behavioral assessment in early childhood. Appropriate measurement of autism is essential for determining appropriate intervention strategies. Whereas, there are only a limited autism measures available for use in China. For this reason, valid and reliable measures of autism for use with Chinese speaking individuals are of critical importance. The purpose of the present study is to begin the process of developing two measures of autism for use with Chinese speaking individuals.

The development of the measures of autism with Chinese speaking population was started by translating the Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) and the Gilliam Autism Rating Scale– Second Edition (GARS-2) into Chinese. The translated versions then were given to a group of 20 Chinese Immigrants. The individual scores were examined to see the relationship between the English version and the Chinese version. The individual scores on the Chinese version and the English version of the CARS2-QPC and the GARS-2 correlated highly and significantly. Therefore, this study provided initial support for these Chinese versions of the CARS2-QPC and the GARS-2. Limitations and recommendations for future research were also discussed.

## TABLE OF CONTENTS

CHAPTER	PAGE
1. INTRODUCTION -----	1
The Symptoms and Nature of Autism -----	1
Social interaction -----	2
Communication -----	3
Repetitive behavior -----	4
Other symptoms -----	5
The Prevalence of Autism Spectrum Disorders in Society -----	6
Autism in China -----	6
Cross-Cultural Development of Tests -----	8
Applying an already existing instrument -----	8
Adapting an already existing instrument -----	8
Assembling a new instrument -----	9
Influence of ICD-10 -----	9
Approach selected for this study -----	9
Concept of Test Development -----	10



Rating Scales Used In This Study -----	11
Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) -----	11
Gilliam Autism Rating Scale–Second Edition (GARS-2)-----	15
Rating Scales Used In China-----	17
Research Questions, Expectations, and Hypothesis of the Investigation -----	18
2. METHODS-----	20
Participants -----	20
Materials -----	20
Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) -----	22
Gilliam Autism Rating Scale–Second Edition (GARS-2)-----	22
Procedure -----	23
3. RESULTS -----	25
Characteristic of Participants-----	25
Similarity of Original and Back-translated versions-----	26
Correlational Analysis -----	27
Descriptive statistics -----	27

Correlational analysis-----	29
Reliability Analysis-----	33
4. DISCUSSION -----	34
Discussion of Participants -----	34
Discussion of the Correlation Analysis-----	36
Discussion of the Coefficient Alpha -----	37
Limitations and Perspective for Future Research -----	37
Limitations -----	37
Suggestions for Future Study-----	39
Strengths of the present study -----	40
5. SUMMARY-----	42
REFERENCES -----	44
APPENDIX	
A. Informed Consent Form -----	51
B. Demographic Information Form -----	53
C. Debriefing Form -----	55
D. The original English Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) -----	58

E. The original English Gilliam Autism Rating Scale–Second Edition (GARS-2) --	65
F. The back-translated English Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) -----	74
G. The back-translated English Gilliam Autism Rating Scale–Second Edition (GARS-2)-----	81
H. The Chinese Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC)-----	92
I. The Chinese Gilliam Autism Rating Scale–Second Edition (GARS-2)-----	99
J. GARS-2 and CARS2-QPC rating scale comparison in English between original and back-translation -----	110
K. Revised GARS-2 and CARS2-QPC rating scale items comparison in English between original and back-translation -----	117
VITA -----	119

LIST OF TABLES

TABLE	PAGE
1. MEAN SCORES AND STANDARD DEVIATIONS OF THE ENGLISH CARS2-QPC, THE CHINESE CARS2-QPC, THE ENGLISH GARS-2, AND THE CHINESE GARS-2-----	28
2. INTERCORRELATIONS BETWEEN THE ENGLISH AND THE CHINESE GARS-2 AUTISM INDEX AND THREE SUBSCALES -----	32

## LIST OF FIGURES

FIGURE	PAGE
1. DISTRIBUTION OF THE CORRELATIONS COEFFICIENTS OF THE ENGLISH AND THE CHINESE CARS2-QPC ITEMS-----	30
2. DISTRIBUTION OF THE CORRELATIONS COEFFICIENTS OF THE ENGLISH AND THE CHINESE GARS-2 ITEMS -----	31

LIST OF ABBREVIATIONS

<u>Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition</u>	----- <u>CARS2-QPC</u>
<u>Gilliam Autism Rating Scale–Second Edition</u>	----- <u>GARS-2</u>

## CHAPTER I

### INTRODUCTION

The purpose of the current study is to develop a valid and reliable version of the CARS2-QPC and the GARS-2 for use with bilingual Chinese or Chinese-American parents living in the United States. The research will include translation of existing valid and reliable measures (CARS2-QPC and the GARS-2) into Chinese, administering both original and translated versions of the instruments to a group of bilingual participants, and comparing their scores on the versions. The first chapter of this thesis will present essential background knowledge necessary for a comprehensive understanding of this study as well as the proposed expectations and hypotheses. Thus, this introduction includes: (1) a brief review of Autism Spectrum Disorders, including a discussion of the major symptoms; (2) a discussion of cross-cultural development of tests; (3) a discussion of concepts of psychological instrument development; (4) a review of available research literature on Autism Spectrum Disorders in China; and finally (5) a discussion of the research questions and hypotheses for this study.

#### The Symptoms and Nature of Autism

In order to fully understand the relevance of this study, one must first understand the behaviors and symptoms associated with Autism Spectrum Disorders. Autistic Disorder is one of several types of pervasive developmental disorders (PDDs), also called autism spectrum disorders (ASDs). There are three most recognized disorders within the autism spectrum (ASDs), the other two being Asperger syndrome, which lacks delays in cognitive development and language, and Pervasive Developmental Disorder-Not Otherwise Specified (commonly abbreviated as PDD-NOS), which is diagnosed when the

full set of criteria for autism or Asperger syndrome are not met (Johnson & Myers, 2007). According to the Centers for Disease Control (CDC), the phrase Autism Spectrum Disorders covers a range of disorders that are characterized by developmental delays, sensory processing issues, and impairments in social behavior. ASDs are highly variable neurodevelopmental disorders that first appear during infancy or childhood, and generally follow a steady course without remission. Overt symptoms gradually begin after the age of six months, become established by age two or three years, and tend to continue through adulthood, although often in more muted form. The autism spectrum as currently defined by the Diagnostic and Statistical Manual of Mental Disorders (Filipek et al., 1999) is distinguished not by a single symptom, but by a characteristic triad of symptoms: impairments in social interaction, impairments in communication, and restricted interests and repetitive behavior. It is not unusual for Autistic Disorder to be confused with other ASDs, such as Asperger's Disorder, or to have overlapping symptoms. Other concerns, such as atypical eating, poor muscle tone, or gastrointestinal (GI) symptoms are also common but are not essential for diagnosis.

Social interaction Social deficits distinguish autism and the related autism spectrum disorders (ASDs) from other developmental disorders (Rapin & Tuchman, 2008).

Individuals with autism do not develop typical personal interactions in virtually any setting. This means that affected persons fail to form the social contacts that are such an important part of typical human development. Making and maintaining friendships often proves to be difficult for those with autism.

Unusual social development becomes apparent early in childhood. Autistic infants show less attention to social stimuli, smile and look at others less often, and respond less



to their own name. As the child develops, interaction with others continues to be abnormal. Autistic toddlers differ more strikingly from social norms; for example, they have less eye contact and turn taking, and do not have the ability to use simple movements to express themselves, such as the ability to point at things (Volkmar & Chawarska et al., 2005). Three- to five-year-old autistic children are less likely to exhibit social understanding, approach others spontaneously, imitate and respond to emotions, communicate nonverbally, and take turns with others. There is usually an inability to develop normal peer and sibling relationships and the child often seems isolated. There may be little or no joy or interest in normal age-appropriate activities. Most autistic children display moderately less attachment security than non-autistic children, although this difference disappears in children with higher mental development or less severe ASDs (Rutgers & Bakermans-Kranenburg, et al., 2004). Children with autism do, however, form attachments to their primary caregivers (Sigman & Dijamco, et al., 2004). Older children and adults with ASD perform differently on tests of face and emotion recognition (Sigman & Spence, et al., 2006), especially if the faces are unfamiliar. Affected children or adults may not seek out peers for play or other social interactions. In extreme cases, they may not even be aware of the presence of other individuals.

Communication Knowledge about human communication is central to theory and clinical practice in the field of autism. Milestones in language and communication play major roles at almost every point in development in understanding autism. Most parents of autistic children first begin to be concerned that something is not quite right in their child's development because of early delays or regressions in the development of speech (Short & Schopler, 1988). Individuals diagnosed with Autistic Disorder may exhibit

differences in their methods of communication. About a third to a half of individuals with autism do not develop enough oral speech to meet their daily communication needs (Noens & Berckelaer-Onnes, et al., 2006). Differences in communication may be present from the first year of life, and may include delayed onset of babbling, unusual gestures, diminished responsiveness, and vocal patterns that are not synchronized with the caregiver. In the second and third years, autistic children have less frequent and less diverse babbling, consonants, words, and word combinations; their gestures are less often integrated with words. Autistic children are less likely to make requests or share experiences, and are more likely to simply repeat others' words or reverse pronouns (Kanner, 1968). Deficits in joint attention seem to distinguish infants with autism: for example, they may look at a pointing hand instead of the pointed-at object, and they consistently fail to point at objects in order to comment on or share an experience (Johnson & Myers, 2007). Autistic children may have difficulty with imaginative play and with developing symbols into language (Landa, 2007).

Repetitive behaviors Repetitive behaviors are common in autism. The diagnostic and statistical manual of mental disorders (DSM-IV) includes them among the necessary criteria for the diagnosis of autistic disorder as “restricted repetitive and stereotyped patterns of behavior, interests, and activities”. These include: a) a preoccupation with stereotyped and restricted patterns of interest, b) inflexibility in adhering to routines and rituals, c) stereotyped and repetitive motor manifestations and d) a persistent preoccupation with parts of objects. All these behaviors are not always present in the same individual and are often not stable over time. In fact, in the same person, they may change not only in quantity but also quality and type. Intensity of behaviors and

topography of the stereotyped movements have been found helpful in distinguishing patients with autism from patients with intellectual disability (Bodfish & Symons, et al., 2000).

Other symptoms Autistic individuals may have symptoms that are independent of the diagnosis, but that can affect the individual or the family (Filipek et al., 1999). Many people with autism have symptoms similar to attention deficit hyperactivity disorder (ADHD). But these symptoms, especially problems with social relationships, are more intense for people with autism (Mayes & Calhoun, 2012). Over 90% of people with autism have unusual sensory perceptions (Geschwind, 2009). For example, they may describe a light touch as painful and deep pressure as providing a calming feeling. Others may not feel pain at all. An estimated 60%–80% of autistic people have motor signs that include poor muscle tone, poor motor planning, and toe walking; deficits in motor coordination are pervasive across ASD and are greater in Autistic Disorder (Geschwind, 2009). Some people with autism have strong food likes and dislikes and unusual preoccupations. Unusual eating behavior occurs in about three-quarters of children with ASD, to the extent that it was formerly a diagnostic indicator. Selectivity is the most common problem, although eating rituals and food refusal also occur; this does not appear to result in malnutrition (Dominick & Davis, et al., 2007). Sleep problems occur in about 40% to 70% of people with autism (Mayes & Calhoun, 2009). About 10% of people with autism have some form of autism savant skills-special limited gifts such as memorizing lists, calculating calendar dates, drawing, or musical ability (Treffert, 2009). Although some children with autism also have gastrointestinal (GI) symptoms, there is a

lack of published rigorous data to support the theory that autistic children have more or different GI symptoms than usual (Erickson & Stigler, 2005).

### The Prevalence of Autism Spectrum Disorders in Society

Autism has a strong genetic basis, although the genetics of autism are complex. It is unclear whether ASD is explained more by rare mutations, or by rare combinations of common genetic variants (Abrahams et al., 2008). In rare cases, autism is strongly associated with agents that cause birth defects (Arndt et al., 2005). Controversies surround other proposed environmental causes, such as heavy metals, pesticides or childhood vaccines; the vaccine hypotheses have been shown to be biologically implausible and lack convincing scientific evidence (Gerber et al., 2009). The prevalence of autism is about 1–2 per 1,000 people worldwide; however, the Centers for Disease Control and Prevention (CDC) reports an approximate number of 1 per 110 children in the United States are diagnosed with ASD in 2011 (CDC, 2011). The number of people diagnosed with autism has increased dramatically since the 1980s, partly due to changes in diagnostic practice; the question of whether actual prevalence has increased is unresolved (Newschaffer et al., 2007).

### Autism in China

China is an important nation in the world's current events both because of its large population and its growing economic power and influence. For some historical reasons, there has been a dearth of scientific literature in China regarding the diagnostic features and treatment of autism in comparison to Western societies (Clark & Zhou et al., 2005). In 1982, Dr. Tao Kuo-tai in Nanjing conducted the diagnosis for the first children in the country to be diagnosed with autism (McCabe, 2010). In the two or more decades since

autism was first diagnosed in China, a growing number of doctors have begun to recognize and diagnose autism in children. There are still many doctors in smaller, more remote locations, however, who are unaware of the disability or its diagnosis. This leads to delayed or incorrect diagnoses in many cases as parents search for a doctor who can help them. The ministry acknowledges that there are no public education programs (including special education) for children in China who have autism. Only private programs exist. One such program is Beijing's Xingxingyu Education Institute for Children with Autism (Clark & Zhou, 2005). The first programs for autism began to provide children with autism services in the early 1990s, including applied behavior analysis (McCabe, 2008). Unfortunately, there have not been enough programs or teachers to provide an education for all children with disabilities. Getting accurate data in China is difficult given the size of the country (estimated to be 3.7 million square miles) and its vast rural areas. One report in 2001 by the Xinhua News Agency estimated that the number of children with autism was between 400,000 and 500,000. This rate is about two or three times lower than what would be expected using prevalence estimates from Western nations such as the United States. No nationwide epidemiological study has been conducted as yet (Wong & Hui, 2008); however, two studies in provinces in East China reveal quite discrepant results. Data collected in Changzhou indicate that 7 of 3,978 children have autism (Wang et al., 2002) whereas a study in the province of Anhui showed that 420 of 3,559 children have autism, or 11.8% of the population (Ren & Duan, 2002).

## Cross-Cultural Development of Tests

Several strategies have been proposed for the development of psychological tests to be used in different cultures. There are three common strategies for developing psychological measures to be applied in another culture: 1) to apply an already existing instrument; 2) to adapt an existing instrument; or 3) to assemble a new instrument (Van de Vijver & Leung, 1997).

Applying an already existing instrument In this approach, the instrument and its translation are used without any modification. It is useful in situations when the instrument covers all important aspects of a studied construct. To apply an existing measure it has to be translated. The back translation method is probably the best known method for instrument translation (Van de Vijver & Leung, 1997). It involves translating items from original language to another by one researcher, translating the translated items back into the original language by another researcher, and comparing the results. To check the accuracy of the translation there are a number of techniques, including a study design in which a group of bilinguals take the source and target versions of the test. Different statistical techniques are also available to evaluate the equivalence of items of the versions.

Adapting an already existing instrument If the existing instrument does not fully cover the construct of interest, the instrument can be adapted by rephrasing, adding or replacing items. For example, when Minnesota Multiphasic Personality Inventory (MMPI) was tested in China some items were found to be meaningless in that cultural context and had to be modified (Cheung, 1989). However, the majority of the items were kept the same

and it was possible to interpret the results in the light of the American norms (Van de Vijver & Leung, 1997).

Assembling a new instrument This approach is used if the original instrument seems to be absolutely inadequate for measuring the construct of interest. It is a rare strategy but, for example, was used in creating personality inventories in some Eastern cultures (Van de Vijver & Leung, 1997).

Influence of ICD-10 Development of the International Classification of Disorders (ICD-10) published by the World Health Organization (1992) was an important step in the development of a world wide consensus of disorders. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) published by the American Psychiatric Association (1994) is structured in accordance with the ICD-10 structure (Andrews & Slade, 1999). By beginning with this “agreed upon” standard of what constitutes the core symptoms of specific physical and psychiatric disorders it is now possible (and easier) to develop cross-cultural tests to assess psychiatric disorders, such as the CCMD-3 (Chinese Classification of Mental Disorders).

Approach selected for this study The current study will utilize existing instruments that are based upon specification of the primary symptoms of autism. These instruments are going to be translated by competent bilinguals. Use of existing instruments has a number of advantages including the possibility of maintaining the same score range and to compare current research results with other studies. Another important advantage is the lower cost of this strategy compared to the development and validation of a new or adapted instrument (Van de Vijver & Leung, 1997). The development of the CCMD-3 (Chinese Classification of Mental Disorders) and DSM-IV also influenced this choice, as

well as an example of a similar instrument measuring autism (CARS - Childhood Autism Rating Scale) that has been translated.

### Concept of Test Development

This section will address the ideas of test development and relate them to the development of cross-cultural tests. According to Brown (1976), test development includes several steps: 1) specify the purpose of the test; 2) construct and present items; 3) assemble a final form of the test; 4) standardize it; and 5) carefully assess reliability and validity of the new instrument.

In applying an already existing instrument for cross-cultural study, the first step includes translation of it into the language of interest. The next step consists of giving the original version of the instrument and the translation to a group of bilingual participants and carefully comparing scores on them. If scores on the original version and the translation are very similar, then a next step could be to field-test the new translated instrument on a large group of participants in the country of interest. A next possible step could be comparing the translated instrument to another existing instrument in the country of interest. Further validation may include administration of the translated instrument to contrasting groups of subjects; for example, to a group of clinically autistic children and a control group of typically developing children.

The current study is the first step of the described above sequence in developing valid and reliable rating scales of autism for use with Chinese speaking individuals. It will include translation of existing valid and reliable American measures of autism into Chinese, administering both original and translated versions of the instruments to a group of bilingual participants, and comparing their scores on the versions.



### Rating Scales Used In This Study

Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) The CARS2-QPC is one of three forms of the Childhood Autism Rating Scale – Second Edition (CARS-2, published in 2010) which resulted from the revision of the Childhood Autism Rating Scale (CARS). The first version of the CARS was published in 1980 (Schopler et al., 1980). This measure was originally correlated with the DSM-III and then with the DSM-III-R.

The CARS is a behavior rating scale intended to help diagnose autism. The CARS was developed by Eric Schopler, Robert J. Reichler, and Barbara Rothen Renner. Initial psychometrics for the CARS were determined using 537 children enrolled in the University of North Carolina's Treatment and Education of Autistic and related Communication handicapped Children (TEACCH) program over a ten year period (Schopler et al., 1980). It was designed to help differentiate children with autism from those with other developmental delays, such as mental retardation. Development of the CARS began in 1966 with the production of a scale that incorporated the criteria of Leo Kanner (1943) and Creak (1964), and characteristic symptoms of childhood autism. (Schopler et al., 1980)

The CARS evaluation criteria is comprised of a diagnostic assessment method that rates children on a scale from one to four for various criteria, ranging from normal to severe, and yields a composite score ranging from non-autistic to mildly autistic, moderately autistic, or severely autistic. The scale is used to observe and subjectively rate fifteen items: relationship to people, imitation, emotional response, body use, object use, adaptation to change, visual response, listening response, taste-smell-touch response and

use, fear and nervousness, verbal communication, non-verbal communication, activity level, level and consistency of intellectual response, and general impressions. This scale can be completed by a clinician or teacher or parent, based on subjective observations of the child's behavior. Each of the fifteen criteria listed above is rated with a score of: 1-normal for child's age, 2-mildly abnormal, 3-moderately abnormal, 4-severely abnormal, Midpoint scores of 1.5, 2.5, and 3.5 are also used.

Total CARS scores range from a fifteen to sixty, with a minimum score of thirty serving as the cutoff for a diagnosis of autism on the mild end of the autism spectrum. Internal consistency of the CARS was high, with a coefficient alpha of .94 (Schopler et al., 1988), indicating the degree to which all of the fifteen scale criteria scores constitute a unitary phenomenon, rather than several individual behaviors. Inter-rater reliability was established using two raters for 280 cases. The average reliability of .71 indicated good overall agreement between raters. In addition, diagnoses based on parent interview and direct observation agreed in 90% of the cases. The authors suggest that valid CARS ratings and diagnoses can be achieved through parent interview. Thus, the CARS is a good screening instrument for adolescents and adults.

The Childhood Autism Rating Scale-Parent version (CARS-P) is an alternative self-report measure for assessing parents' perceptions of their children's level of functioning. It is a direct adaptation of the CARS. The categories of the CARS-P (Bebko et al., 1987) are the same as those of the CARS, with the exception of the deletion of one item, general impressions. For each of the 14 domains (e.g., nonverbal communication, verbal communication, relatedness with others,) severity is rated on a 4-point scale ranging from 1 (*normal for chronological age*) to 4 (*severely abnormal for chronological age*). In

addition, parents rate the stressfulness of each domain on a 4-point scale ranging from 1 (*none at all*) to 4 (*extreme*).

Utilizing a sample of 20 children ranging in age from 6 to 18 years (median=9 years, no mean reported), Bebko et al. (1987) compared parent-reported CARS-P severity and stress scores with scores given by professionals. There was agreement between mothers' and fathers' ratings, both of which were similar to professionals' ratings. Parents of older children gave lower (i.e., less severe) ratings than those of younger children. Also, those families who reported the most stress on the CARS-P experienced more disruption in their family during the subsequent year. Freeman et al. (1991) sought to further validate the CARS-P with a sample of 25 children with autism or general PDD (age range of 3 years, 9 months to 20 years, 11 months, mean=10 years, 7 months). No difference was found between parents' CARS-P and professionals' CARS ratings of severity. Also, consistent with previous findings, there was strong agreement between mothers' and fathers' severity ratings.

Like the original CARS, the Childhood Autism Rating Scale – Second Edition (CARS-2) is an older, more traditional autism spectrum characteristic checklist. This measure may assess individuals with more classic autism symptoms, as well as being more responsive to individuals on the "high functioning" end of the Autism Spectrum—those with average or higher IQ scores, better verbal skills, and more subtle social and behavioral deficits (Bourgondien et al., 2010). While retaining the simplicity, brevity and clarity of the original test, the CARS2 adds forms and features that help integrate diagnostic information, determine functional capabilities, provide feedback to parents and design targeted intervention. The CARS2 includes three forms: 1.) Standard Version

(CARS2-ST) Rating Booklet --- equivalent to the original CARS use with individuals younger than 6 years of age and those with communication difficulties or below-average estimated IQs; 2.) High Functioning Individuals (CARS2-HF) Rating Booklet --- an alternative for assessing verbally fluent individuals, 6 years of age and older, with IQ scores above 80; and 3.) Questionnaire for Parents or Caregivers (CARS2-QPC) --- an unscored scale that gathers information for use in making CARS2-ST and CARS2-HF ratings (Bourgondien et al., 2010). The CARS2-QPC is an unscored form completed by the parent or caregiver of the individual being assessed. It has five levels scales: not a problem, mild-to-moderate problem, severe problem, not a problem now but was in the past, and don't know. The scale is used to observe and subjectively rate 36 items in six sections: communication, relationship to others and emotional response, body movement, playing, reaction to new, and senses using. The areas covered by the CARS2-QPC include the individual's early development; social, emotional and communication skills; repetitive behaviors; play and routines; and unusual sensory interests (Bourgondien et al., 2010). Its purpose is to give the clinician more information on which to base CARS2-ST or CARS2-HF ratings. Often the questionnaire serves as the framework for a follow-up interview, during which the clinician can clarify and interpret the responses provided by the parent or caregiver.

Reliability and validity information is not currently available for the CARS2-QPC because the authors intended this measure primarily as an informal source of information to be used by professionals who would then complete the Childhood Autism Rating Scale Standard Version (CARS2-ST). For the purposes of examination in the current study, responses on the CARS2-QPC were given numerical value. Reliability and validity have

been shown to be good for the CARS2-ST, including reports of an internal reliability coefficient of .93 and moderate to strong correlations with other autism-related screening devices as indications of validity (Vaughan, 2011).

Gilliam Autism Rating Scale–Second Edition (GARS-2) The GARS-2, published in 2010 is developed from the first version of the Gilliam Autism Rating Scale (GARS) published in 1995. The norms of the GARS were obtained using data collected from 1,092 children, adolescents, and young adults from the United States and Canada and this instrument is in wide use. It should be noted that since the release of the original GARS, several studies have challenged its normative sample and claimed that the test scores resulted in too many false negatives (Bourgondien et al., 2010). The first version of the GARS contains four subscales used to produce a total autism quotient: Stereotyped Behaviors, Communication, Social Interaction, and Developmental Disturbances. Although significant correlations exist between the three subscales that evaluate current behavior, the Developmental Disturbances subscale was not significantly correlated with any other subscale in the GARS (South et al., 2002). Consequently, the Developmental Disturbances subscale was dropped from the Autism Index in the latest version but has subsequently been revised and now appears in the GARS-2 in the form of a parental interview. In addition, the GARS-2 offers a number of improvements over the original edition. The manual clarifies test items on each subscale (Stereotyped Behaviors, Communication, Social Interaction) by providing detailed behavioral descriptors which decrease the potential false-negative autism diagnoses (Montgomery et al., 2008). Aside from being relatively simple and quick to complete, the GARS-2 has the added advantage of a flexible format. Parents need not be the sole raters; ratings can be provided by

anyone who knows the individual well. Furthermore, the instrument can be completed in the absence of the examiner.

The Gilliam Autism Rating Scale–Second Edition (GARS-2) is a screening tool for autism spectrum disorders for individuals between the ages of 3 and 22. Its purpose is to help professionals screen patients/clients for Autism Spectrum Disorders, but in a school setting, it may also be used to help educational teams determine whether a child may meet state educational criteria for receiving special education services under the Autism Spectrum Disorder category (Montgomery et al., 2008). This scale is divided into nine sections includes three key components: subscale and composite scores, a parent interview, and key questions to enable diagnostic accuracy. The three subscales of the GARS-2 contain 42 Likert-type items measure a series of negative behaviors reflecting the three primary areas (Stereotyped Behaviors, Communication, and Social Interaction) of the DSM-IV-TR criteria for the diagnosis of autism. In addition, an Autism Index provides a composite indication of autism severity. Respondents are required to choose from one of the four possible choices provided for each of 42 Likert-type items, ranging from 0 (*never observed*) to 3 (*frequently observed*). The last two sections of the GARS-2 are completed via an interview with a parent or caregiver who has had sustained contact with the individual. In the first part of the interview, the respondent is asked to answer yes or no to a series of questions pertaining to the child's development in his or her first 3 years. In the final section of the GARS-2, the respondent is prompted to answer a series of open-ended questions regarding medical history, behavior, symptoms of autism spectrum disorders, and parental concerns. The GARS-2 uses a standardized score referred to as the Autism Index. It has a mean of 100 and a standard deviation of 15.

Scores of 85 or higher on the Autism Index indicate that an individual is likely to have autism. Scores of 70 to 84 indicate that an individual may have autism, and any score of 69 or less suggests that it is unlikely that the individual has autism.

The GARS-2 has a good reliability and validity and is considered sufficient as a specific screening measure to contribute to the diagnosis of autism (Montgomery et al., 2008). The GARS-2 shows good internal consistency for the three subscales and the total scale with coefficient alphas ranging from .84-.94. The validity of the GARS-2 was demonstrated through several studies. These studies confirm that (a) the items of the subscales are representative of the characteristics of autism; (b) the scores are strongly related to each other and to performance on other tests that screen for autism, and the GARS-2 can discriminate persons with autism from other individuals with severe behavioral disorders; (c) the scores are not related to age; and (d) persons with varying diagnoses will score differentially on the GARS-2 (Kurt & Geisinger, 2007).

#### Rating Scales Used In China

In China, there is only a limited amount of research literature on applications of different autism measures since the first report of autism by Dr. Tao. In Chinese clinical application and research, the CCMD-3 (Chinese Classification of Mental Disorders) (Jing & Xiao-Ling et al., 2006) and DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) (Jing & Xiao-Ling et al., 2006) are widely used for evaluating and recording a diagnosis of autism. In addition, the ABC (Autism Behavior Checklist) (Yang et al., 1993), CABS (Children's Autism Behavior Scale) (James Song & Fang et al., 2009), WABS (Waterville Autistic Behavior Scales) (James Song & Fang et al., 2009), and M-Chat (Modified Checklist for Autism in Toddlers) (James Song & Fang et al., 2009) have

been applied for autism screening. The CARS (Childhood Autism Rating Scale) (Jing & Yufeng et al., 2004) and MMPI (Minnesota Multiphasic Personality Inventory)(Cheung & Song et al., 1989) have also been reported in the literature as assistive in making an autism spectrum diagnosis (James Song & Fang et al., 2009) . The PEP-R (Psychoeducational Profile Revised) (Sun & Wei et al., 2000) for educational training and assessment of young children with autism has also been translated and adapted in China. The first author of this thesis practiced as a psychiatrist in China. The Autism Behavior Checklist (ABC) and Childhood Autism Rating Scale (CARS) are the main autism rating scales used in the mental hospital in which she worked.

#### Research Questions, Expectations, and Hypothesis of the Investigation

The purpose of this study was to take a first step in the process of developing a valid and reliable parent report scale of autism spectrum characteristics in Chinese. This project entailed translating two already existing valid and reliable American measures of autism, The Childhood Autism Rating Scale – Second Edition Questionnaire for Parents or Caregivers (CARS2-QPC) and The Gilliam Autism Rating Scale-2 (GARS-2), into Chinese and then giving the instruments in both English and Chinese languages to a group of bilingual Chinese immigrants/students who are parents of typically developing children. Then, their scores on the English and Chinese versions of the scales were compared. This was a preliminary validation assessment to determine the two new instruments' utility with Chinese speaking populations. The question examined in the current study is the degree to which Chinese versions of CARS2-QPC and GARS-2 accurately measure parent endorsement of questions about their child's behavior. The question this line of research eventually hopes to answer is how accurately the Chinese



versions of these instruments will measure endorsed autism spectrum symptoms by parents who are rating their children with autism. In order to answer the current question, scores on the CARS2-QPC and its Chinese version were correlated and, similarly, scores on GARS-2 and its Chinese version were correlated. The following were expectations and hypotheses for the current study:

Expectation: Given the similarity of content using almost literal translation, it is expected that Chinese versions and CARS2-QPC and GARS-2 will highly correlate.

Hypothesis 1: It is hypothesized that scores on the Chinese CARS2-QPC will significantly and positively correlate with scores on the CARS2-QPC.

Hypothesis 2: It is hypothesized that scores on the Chinese GARS-2 will significantly and positively correlate with scores on the GARS-2.

## CHAPTER II

### METHODS

#### Participants

Participants consisted of 20 bilingual Chinese-English speaking parents among students and researchers of the University of Kentucky, and among other Chinese immigrants living in Kentucky. A convenience sampling method was employed. Participants were parents of at least one neurotypically developing child ages 2 years through 17 years. The participants in the current study were voluntary. The investigator asked volunteers to participate in the study and promised to send a summary of the results after the study was completed.

#### Materials

The participants in the current study were asked to complete Chinese and English versions of both the CARS2-QPC and the GARS-2. The CARS2-QPC and the GARS-2 are the most widely used standardized instruments specifically designed to aid in the diagnosis of autism for use with children as young as 2 years of age. Back-translation was used as part of the process of developing the Chinese version of these instruments (Asiamarketresearch, n.d.). The English versions were translated into Chinese by one bilingual speaker fluent in both languages with the help of three other bilingual speakers. The translation kept the format, response scale, and instructions of original measures. After they were translated into Chinese by two bilingual speakers, the other two bilingual speakers who did not participate in the original translation converted the Chinese language scales back into English language scales. All of these three bilingual speakers have doctoral (Ph.D.) degrees and work at a state university as physiology

research scientists. One bilingual speaker who assisted the author in translating the original English versions into Chinese versions is a Chinese 38 year-old male who has lived in the USA for 7 years. For the other two bilingual speakers, one is a Chinese 59 year-old female who received her doctoral degree in England. She lived in England for 5 years and then came to USA 15 years ago. Another one is a 33 year-old male who obtained his master's degree and doctoral degree in the USA. All of them are fluent in both Chinese and English. Then, five native English speakers evaluated both the original English version and the back-translated English version. The average age of these five raters is approximately 30 years-old and they are all European-American. Three of them are graduate students at a state university; one is working at a state university as a graphic artist with bachelor's degree, another one is working at a regional university as an administrative assistant with an associate's degree. These evaluations were completed on a 5-point scale (1 = *extremely different*, 5 = *extremely similar*). The similarity of the original English version and the back-translated English version was determined by the five native English speakers. There were 62 items on CARS and the 134 items on the GARS needed to be rated by these five native English speakers. Then researcher conducted a mean score for each item to determine consistency. There were only six items that were scored no more than 3 (uncertain). These six items were revised to more accurately reflect the intent of the original English version and let five native English speakers evaluated them again. To enhance the validity of the results, an independent set of five raters were asked to rate the similarity between the revised items and the original English items. Two of the five raters are research scientists working at a state university and the other three are graduate students at a regional university. Finally, the Chinese versions were confirmed.

This practice is consistent with the practice used in the development of a variety of cross-cultural measures of psychological constructs (Van de Vijver & Leung, 1997).

Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) The CARS2-QPC is one of three forms included in the Childhood Autism Rating Scale – Second Edition (CARS-2, published in 2010) which is a behavior rating scale intended to help diagnose autism. The other two forms of CARS-2 are Standard Version (CARS2-ST) Rating Booklet and High Functioning Individuals (CARS2-HF) Rating Booklet. The CARS2-QPC is an unscored scale that gathers information from the parent or caregiver of the individual being assessed for use in giving the clinician more information on which to base CARS2-ST or CARS2-HF ratings (Bourgondien et al., 2010). There are five level scales (“not a problem”, “mild-to-moderate problem”, “severe problem”, “not a problem now but was in the past”, and “don’t know”) in the measure to observe and subjectively rate 36 items in six sections: communication, relationship to others and emotional response, body movement, playing, reaction to new, and senses using. These six sections cover the individual’s early development; social, emotional and communication skills; repetitive behaviors; play and routines; and unusual sensory interests (Bourgondien et al., 2010).

Gilliam Autism Rating Scale–Second Edition (GARS-2) The GARS-2, published in 2010, a revision of the popular Gilliam Autism Rating Scale, assists teachers, parents, and clinicians in identifying and diagnosing autism in individuals ages 3 through 22 years. It also helps estimate the severity of the child's disorder. Items on the GARS-2 are based on the definitions of autism adopted by the Autism Society of America and the Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition-Text Revision

(DSM-IV-TR) (Montgomery et al., 2008). The instrument consists of 42 Likert-type items, ranging from 0 (*never observed*) to 3 (*frequently observed*), describing the characteristic behaviors of persons with autism. The items are grouped into three subscales (Stereotyped Behaviors, Communication, and Social Interaction). The GARS-2 also includes a parent interview and questions to consider during diagnostic decision-making. The GARS-2 uses a standardized score referred to as the Autism Index which has a mean of 100 and a standard deviation of 15. Scores of 85 or higher on the Autism Index indicate that an individual is likely to have autism. Scores of 70 to 84 indicate that an individual may have autism, and any score of 69 or less suggests that it is unlikely that the individual has autism.

### Procedure

The examiner administered the English and Chinese versions of both the CARS2-QPC and the GARS-2 to each participant individually. Initially, the examiner briefly explained the procedures of the study and the confidentiality of the participant's response. After the participant signed his/her informed consent form (Appendix A) he/she was asked to complete a brief demographic questionnaire (Appendix B). Then the packet consisting of the four measures (English CARS2-QPC and GARS-2, and Chinese CARS2-QPC and GARS-2) and instructions for the participant were handed to him/her. Each participant completed the Chinese and English versions of both the CARS2-QPC and the GARS-2. The order of the presentation was varied in order to randomize order effects. When participants asked questions about the scales, the discourse remained in Chinese when the Chinese-language measure was being taken. The discourse was conducted in English when the English-language measure was being taken. Participants were allowed to use an electronic translator if this is a tool that they

regularly use in daily life. Participant questions about the clinical content of the scale were answered, but not specific questions about the meanings of words or other linguistic-related queries. All questions were recorded for later analysis.

The average time used to complete the battery of measures was about 50 minutes. This varied depending on the participant's familiarity with English, need to spend time with an electronic translator, etc. After the questionnaires had been scored, if any of the participants score fell into the range associated with the autism spectrum, the families were contacted and informed of developmental and educational resources available in the community.

## CHAPTER III

### RESULTS

The purpose of this study was to make a first step in developing valid and reliable measures of autism in Chinese. This study involved translating two American measures of autism, The Childhood Autism Rating Scale – Second Edition Questionnaire for Parents or Caregivers (CARS2-QPC) and The Gilliam Autism Rating Scale-2 (GARS-2), into Mandarin Chinese. After the Chinese versions were confirmed through back-translation, these four instruments (the English CARS2-QPC, the Chinese CARS2-QPC, the English GARS-2, and the Chinese GARS-2) were then administered to a group of bilingual Chinese immigrants, many of whom were graduate students or researchers at a Midwestern university or spouses of these researchers. The individuals' scores on each version of the instrument were determined. These scores were then compared by way of correlational analysis to see if they demonstrated a high correlation between the English version and the Chinese version of each of the scales.

The rationale underlying this step was that if the Chinese versions of the CARS2-QPC and GARS-2 correlated highly with the English versions, then they were inferred to be two instruments were measuring the same construct. Further, this would provide some preliminary (tentative) support for the Chinese versions of the CARS2-QPC and GARS-2. The characteristics of participants, linguistic analysis, and the results of the correlational analyses are reported in this chapter.

#### Characteristic of Participants

A total of 20 bilingual Chinese immigrants currently residing in Kentucky were recruited to participate in this study. Because these two rating scales must be completed by parents

or caregivers all of these participants were parents of at least one neurotypically developing child ages 2 years through 17 years. The participants consisted of 4 (20%) males and 16 (80%) females. Their reported occupations mainly consisted of homemaker (30%), researcher (25%), and student (20%). About 75% of the participants were attending or had completed graduate school. About 20% of participants had graduated from college, and about 5% had some college education. The ages of the participants ranged from 26 to 41, with a mean of 35.30 (SD = 3.84). The length of stay in the United States ranged from 2 to 15 years, with an average of 7.13 years (SD = 3.58). Their children consisted of 15 (75%) boys and 5 (25%) girls; the ages of their children ranged from 2 to 9 years, with a mean of 4.63 years (SD = 2.22).

#### Similarity of Original and Back-translated versions

Five native English speakers compared the original English version and the English-to-Chinese-to-English back-translated version of each scale using a 5-point scale (1 = *extremely different*, 5 = *extremely similar*). Of the 62 items on CARS and the 134 items on the GARS, only 6 items had a mean score of 3.00 or lower as determined by the five raters. The intraclass correlation coefficient across the 5 raters for each item on these two measures is .94,  $p < .001$ , suggesting there is high reliability between the raters. These 6 items were again examined and re-translated. When the five original raters re-examined these revised six items, they were all found to have a mean rating of 4.8 on the similarity scale. Then an independent set of five raters (as described above) rated these six revised items again and had a mean rating of 4.7 on the similarity scale. Thus, we conclude that the original English version and the translated Chinese version are very similar.



### Correlational Analysis

The main purpose of this study was to start the validation process of Mandarin Chinese versions of two autism rating scales. This was accomplished by administering both the CARS2-QPC and the GARS-2 and their Chinese translations to a group of bilingual respondents and correlating the scores on the American and Chinese versions of the each instrument. The scores were correlated using Pearson's product moment correlation, which examined the relationships between the CARS2-QPC and its Chinese translation and the GARS-2 and its Chinese translation.

Descriptive statistics The Childhood Autism Rating Scale 2-Questionnaire for Parents and Caregivers (CARS2-QPC) is designed to provide clinicians with qualitative information from a parent perspective. As used clinically, it does not have a numerical scoring system. For the purposes of the current analyses, however, the researcher assigned as 5-point Likert-type scale response options the numbers 1 through 5, with 1 indicating "not a problem", 2 indicating "mild to moderate problem", 3 indicating "severe problem", 4 indicating "not a problem now, but was in the past", and 5 indicating "don't know". Using this numerical system, the mean score on the English CARS2-QPC was 1.18 and the standard deviation was 0.27. The mean score on the Chinese CARS2-QPC was 1.18 and the standard deviation was 0.27. Means for both versions fell at the "not a problem" range. The mean scores and standard deviations for both Chinese and English CARS2-QPC are presented in the Table 1.

The GARS-2 provides both raw and standardized scores. Raw scores were chosen for use in the correlational analysis section of this research. Both raw and standard scores will be presented here, so that interpretation of the standard scores can demonstrate whether this

population was reporting standard scores in the “Very likely”, “Possibly”, or “unlikely” to have autism range. Mean raw scores for the English version were as follows for the 3 subscales of the GARS-2: Stereotyped Behaviors (M = 4.75; SD = 3.86 ), Communication (M = 3.70 ; SD = 3.47 ), and Social Interaction (M = 3.30 ; SD = 3.44 ); Mean raw scores for the Chinese version were as follows for the 3 subscales of the GARS-2: Stereotyped Behaviors (M = 4.75; SD = 3.86 ), Communication (M = 3.65 ; SD = 3.45 ), and Social Interaction (M = 3.25 ; SD = 3.42 ). The average Autism Index (standard score with M = 100; SD = 15) was the same (M = 57.6; SD = 9.90) for the Chinese version and the English version. Both of these average Autism Index scores fall at the “unlikely” to have autism range. The mean and the standard deviation for each instrument are listed in the Table 1.

TABLE 1  
MEAN SCORES AND STANDARD DEVIATIONS OF THE ENGLISH CARS2-QPC,  
THE CHINESE CARS2-QPC, THE ENGLISH GARS-2, AND THE CHINESE GARS-2  
(N=20)

Variable		Mean	Standard Deviation
English CARS2-QPC		1.18	0.27
Chinese CARS2-QPC		1.18	0.27
English GARS-2	Stereotyped Behaviors	4.75	3.86
	Communication	3.70	3.47
	Social Interaction	3.30	3.44
	Autism Index	57.6	9.90

TABLE 1 (continued)

	Variable	Mean	Standard Deviation
Chinese GARS-2	Stereotyped Behaviors	4.75	3.86
	Communication	3.65	3.45
	Social Interaction	3.25	3.42
	Autism Index	57.6	9.90

Correlational analysis The analysis was conducted on the assigned scores on the English and Chinese CARS2-QPC and raw scores on the English and Chinese GARS-2. In general, the analyses found that the English CARS2-QPC was significantly correlated with the Chinese CARS2-QPC, and the English GARS-2 was significantly correlated with the Chinese GARS-2. The distributions of the correlations coefficients are shown in Figure 1 and Figure 2. Most of the correlations are 1.00, meaning that the English and Chinese versions were identical, and the few correlations that are not 1.00 are statistically significant and very high.

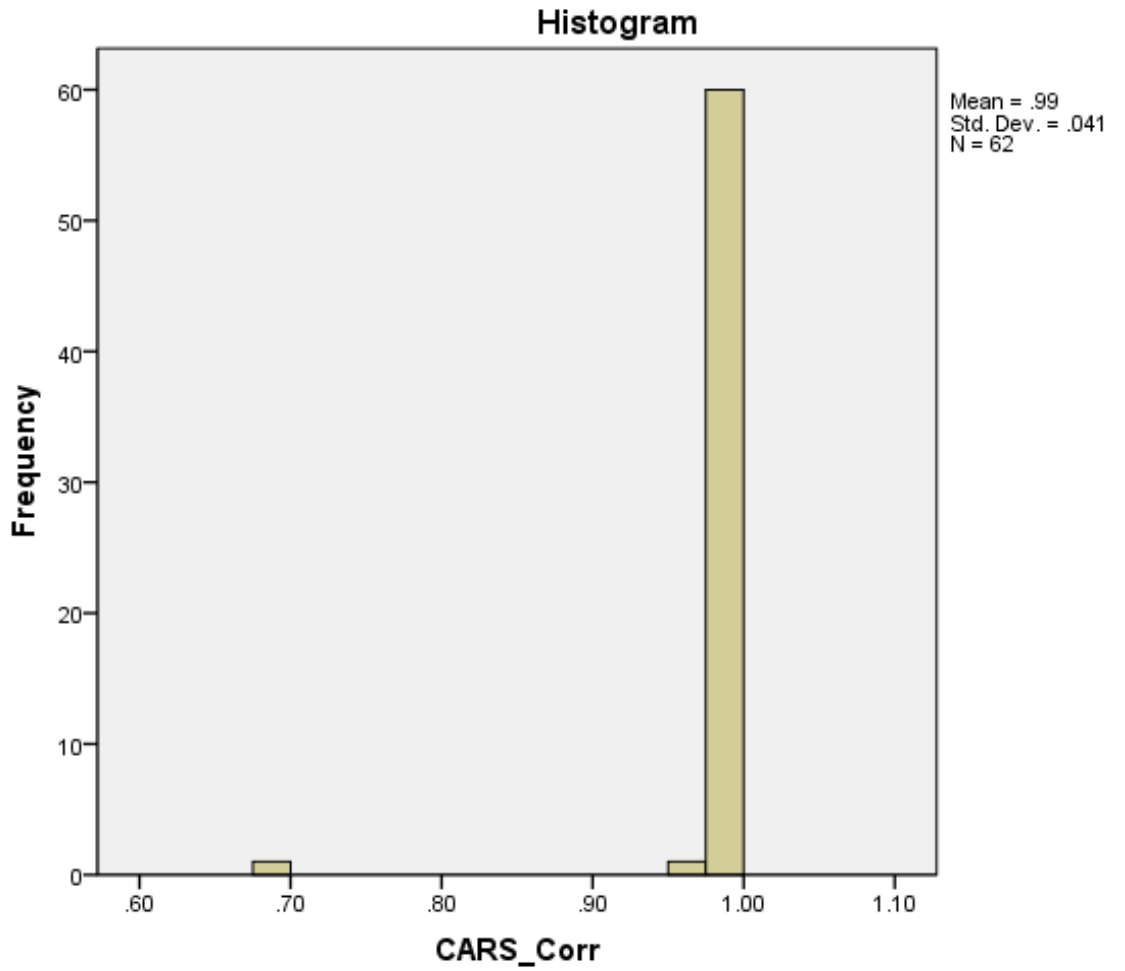


FIGURE 1

DISTRIBUTION OF THE CORRELATIONS COEFFICIENTS OF THE ENGLISH  
AND THE CHINESE CARS2-QPC ITEMS

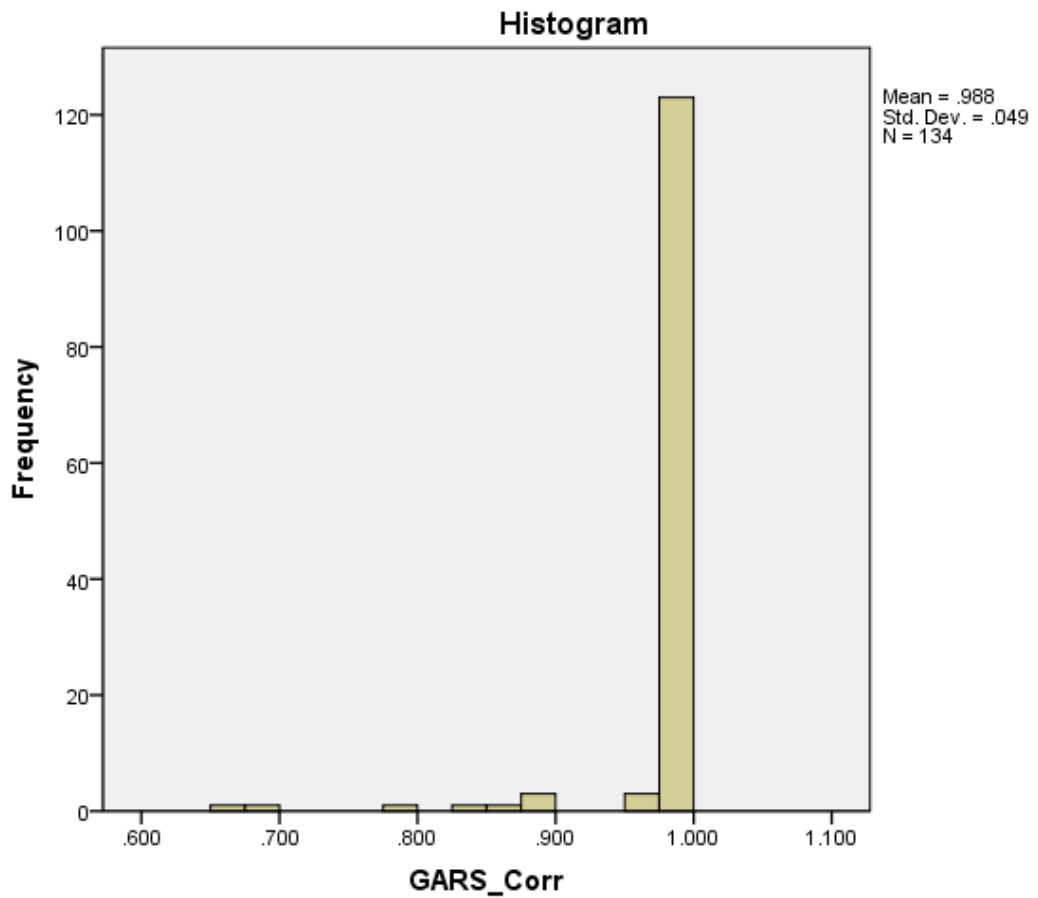


FIGURE 2

DISTRIBUTION OF THE CORRELATIONS COEFFICIENTS OF THE ENGLISH  
AND THE CHINESE GARS-2 ITEMS

The GARS-2 reports subscales of stereotyped behavior, communication, social interaction, and an autism index. The correlations between the English and Chinese versions of the GARS-2 for these subscales were computed. The correlations are 1.00, .998, .998, and 1.00, all  $p < .001$ . These very high correlations indicate that both the English and Chinese versions of the GARS-2 are very similar. The correlation coefficients are listed in Table 2.

TABLE 2  
 INTERCORRELATIONS BETWEEN THE ENGLISH AND THE CHINESE  
 GARS-2 AUTISM INDEX AND THREE SUBSCALES

(N=20)

		Chinese GARS-2			
		Stereotyped Behaviors	Communication	Social Interaction	Autism Index
English GARS-2	Stereotyped Behaviors	1.00*	---	---	---
	Communication	---	.998*	---	---
	Social Interaction	---	---	.998*	---
	Autism Index	---	---	---	1.00*
	Autism Index	---	---	---	1.00*

\* Correlations are significant at the .01 level (2 tailed)

The results of the study support the hypotheses that scores on the Chinese GARS-2-QPC would significantly and positively correlate with scores on the English GARS-2-QPC and that scores on the Chinese GARS-2 would significantly and positively correlate with scores on the English GARS-2. That is, high scores on the English version of these two autism rating scales go with high scores on the Chinese versions of these two scales, and low scores on the English scales go with low scores on the Chinese scales. These strong correlations are thought to be caused by structural similarities between the

instruments and their translations due to utilization of literal translation, same format, and same response scale.

### Reliability Analysis

In addition to completing correlations between the scores on the CARS2-QPC, GARS-2 and their translations, the internal consistency of the Chinese CARS2-QPC and the Chinese GARS-2 were calculated using coefficient alpha (Brown, 1976). The coefficient alpha for the overall score of the Chinese CARS2-QPC was .91, for the overall score of the Chinese GARS-2 was .89, and for the score of each of the 3 subscales of the GARS-2 was .70, .71, and .77, suggesting good internal consistency (coefficient alpha) for these measures in this non-clinical population.

## CHAPTER IV

### DISCUSSION

This thesis was conducted as an initial step in developing valid and reliable versions of the CARS2-QPC and the GARS-2 to be used by Chinese parents in United States and China. The study was accomplished by translating two questionnaires for autism scale rating (CARS2-QPC and GARS-2) into Mandarin Chinese and correlating the scores from the original surveys and the Chinese versions. There is a limited amount of research literature on applications of different autism measures in China. This study was designed to introduce Chinese versions of autism rating scales for the Chinese population in America and China, and to contribute to the current literature. This section of this paper will discuss the findings and conclusions in this study as well as provide an overview of current study limitations and perspectives for future research.

#### Discussion of Participants

The result analysis demonstrated that all of the individual mean scores of the participants fall into “Not a Problem” category except one on both English CARS2-QPC and Chinese CARS2-QPC. The ratings range from "unlikely" to "possibly" (only two fall into “possibly”) on the English GARS-2 and Chinese GARS-2 scoring scales. The extended range of scores is important in correlational analyses because it prevents attenuated correlation coefficients due to the lack of variability (Diekhoff, 1992). More confidence can be placed in the results of this study because of the wide range of obtained scores.

The scores of each individual on English CARS2-QPC and Chinese CARS2-QPC range from 1.00 to 2.00 (only one scored a 2). The mean scores of the participants on both versions are the same (1.18). This score falls into the "not a problem" category. The



Autism Index (standard score with  $M = 100$ ;  $SD = 15$ ) of each individual ranges from 41 to 74 (two scores of 74). The average Autism Index of the participants is 57.6 with a standard deviation 9.9 for both the English GARS-2 and Chinese GARS-2, which falls in the "unlikely" category.

It is important to discuss the range of scores from the participants. First, scores on both English versions and Chinese Versions are very low and no one scored at the range of "Severe Problem" or "Very Likely". There are two reasons for the low scores shown in this study. One is the relatively low rate of autism incidence, with approximately 1 out of 110 U.S. children diagnosed as ASD in 2011 (CDC, 2011). Due to the small sample size in this study it is reasonable that none of the participants falls into the "Severe Problem" or "Very Likely" ranges. Another reason may be Chinese parents' attitude to their children's weaknesses or disabilities. Fong and Hung (2002) compared attitudes toward disabilities across cultures and found that attitudes toward children's disabilities in mainland China are far more negative than in other countries or regions. Their study also demonstrated that family members in Hong Kong as well as in mainland China are often unwilling to admit having a family member with disabilities due to shame or fear of discrimination. For above reasons it is very likely that Chinese parents may underreport their children's problems.

The second point to be noted is that there are two individual's scores on GARS-2 in the "possibly" range but only one participant's score on CARS2-QPC falls into the "mild-to-moderate problem" range. Also, the single participant scoring at "mild-moderate problem" from CARS2-QPC does not overlap with the two individuals having "possibly" scores from GARS-2. The possible reason is that the scoring criteria for these two

screening scales are different. The rating instructions of GARS-2 are very clear which help raters to decide which score they would choose. For example, “1” means seldom observed--- individual behaves in this manner 1-2 times per 6-hour period. In the CARS2-QPC there is not any instruction or introduction to guide raters how to rate. Most of the questions participants in this study asked were about the CARS2-QPC. For example, item 6 in section 1 of the CARS2-QPC reads as follows: Uses made-up words or repeats specific words or phrases --- not a problem (does very well); mild-to-moderate problem (sometimes a problem); severe problem (often or always a problem); not a problem but was in the past. Many participants were confused about whether “not a problem (does very well)” means child uses made-up words or repeats specific words or phrases very well or whether the child doesn’t engage in those behaviors. Also, many participants didn’t know what the criterion was for “does very well”, “sometimes”, and “often”. As discussed above, Chinese parents, related to Chinese culture, may not want to admit to their children having a problem, so most of them chose “not a problem”. This is an additional possible explanation for why the mean scores of the sample on the two versions was only 1.18.

#### Discussion of the Correlation Analysis

When examining the correlational data obtained, it appears that the Chinese CARS2-QPC correlates significantly and positively with the English CARS2-QPC and the Chinese GARS-2 correlates significantly and positively with the English GARS-2. This suggests that the scores on the Chinese CARS2-QPC and English CARS2-QPC co-vary, as well as the scores on the Chinese GARS-2 and English GARS-2. The average scores on Chinese versions correspond to the average scores on English versions, and the higher scores also

coincide respectively. The strong correlation coefficients found between the English CARS2-QPC and Chinese CARS2-QPC, as well as English GARS-2 and Chinese GARS-2 suggest that these pairs of instruments are measuring the same thing. These findings support the hypotheses and provide evidence for the validity of the Chinese CARS2-QPC and the Chinese GARS-2.

#### Discussion of the Coefficient Alpha

The results of this study indicate that both the Chinese CARS2-QPC and GARS-2 have high internal consistency as measured by Cronbach's coefficient alpha (Anastasi, 1982). This coefficient is calculated on the average inter-item correlations. The specific coefficient alpha for Chinese CARS2-QPC was .91 and the specific coefficient alpha for Chinese GARS-2 was .86. High internal consistency means that all items of an instrument measure the same construct. This is the case with the Chinese CARS2-QPC and the Chinese GARS-2.

#### Limitations and Perspective for Future Research

The current study provides initial support for the Chinese versions of the CARS2-QPC and GARS-2. There are several limitations of the study, however, that need to be addressed. These limitations are: small sample size, utilization of non-clinical participants, restricted educational range of the participants, and limited age range of the participants. Suggestions for future research will be discussed after the review of limitations of this study.

Limitations The first limitation of the study is the small sample size. This study used a sample consisting of 20 participants. A larger sample size is desirable to increase the confidence in and generalizability of the results. For example, Chlebowski et al. (2010)

used 606 children as a normative sample to investigate the children autism rating scale (CARS) as a tool for ASD diagnoses.

The second limitation of this study involved utilization of a non-clinical sample. Clearly, inclusion of a clinical sample would increase confidence and generalizability of the results. A clinical population consisting of individuals seeking mental health services or evaluations for their children suspected of having autism spectrum disorders would make the sample more representative of individuals for which the CARS2-QPC, GARS-2, and their Chinese translations were designed. For example, a Spanish translation of Autism Detection in Early Childhood (ADEC-SP) was applied to both clinical and non-clinical children (Hedley & Young, et al., 2010). Therefore, the use of clinical sample and populations are suggested for future research on the Chinese CARS2-QPC and GARS-2.

The third limitation of the current study is the restricted educational range of the sample. The current sample primarily involved researchers, graduate students, and their spouses living in Central Kentucky. About 75% of the participants are attending or completed graduate school. Whereas, in the general population the percent of people with graduate education is significantly smaller than in the present sample. In 2010, 30 percent of adults 25 and older had at least a bachelor's degree, only 11 percent of adults 25 and older had an advanced degree in United States (U.S. Census Bureau, 2011). In addition, Chinese living in Central Kentucky may not be representative of the general Chinese American population. One way to select a more representative sample in the future study would be to get a survey of Chinese living in the US and randomly select participants for

the research sample. However, this type of research organization is expensive and difficult to accomplish without the collaborative effort of a group of researchers.

The last limitation of the study involved the narrow age range of the participants. The ages of the children in the present study ranged from 2 to 9 years, with a mean of only 4.63 years. As mentioned earlier, the present study planned to recruit children aged 2 to 17 years old. Therefore, the generalizability of the results for a wider age range is limited. Future studies need to include respondents from a variety of age groups, ranging from 2 to 17 years.

Suggestions for Future Study The proposals for future study are based on the limitations of the current study as follows: (1) increase the sample size; (2) include a clinical population; (3) increase demographic diversity of the sample; and (4) continue validating research on the Chinese CARS2-QPC and GARS-2.

The generalizability and confidence in the results will increase with enlarging the sample size, including a substantial clinical sample, and using a demographically diverse population in terms of age, education, and other characteristics.

Overall, the current research was intended to be a first step in a larger program of research to develop valid and reliable measures of autism for Chinese-speaking individuals. Future study should also focus on other psychometric properties of the Chinese CARS2-QPC and GARS-2, for example, on concurrent, discriminant, and convergent validity. Additional study is needed on the reliability of these instruments. In that light, the next step in this line of research might be administering the Chinese CARS2-QPC and GARS-2 to a larger sample of Chinese participants. Another aspect for future study will include applying the measures to contrasting groups, to a clinical sample

and non-clinical control sample, to see whether the Chinese CARS2-QPC and GARS-2 would discriminate between the groups. Future research could also involve comparing the Chinese CARS2-QPC and GARS-2 to other instruments in China that are currently used to assess characteristics of autism.

Strengths of the present study The discussion of the limitations of the present study is important and useful for planning future research. The present study does, however, have two clear strengths. First of all, the present study has high clinical value. Mandarin Chinese is the primary language spoken at home for most of Chinese families which live in USA. Because of the language barrier, many Chinese parents don't understand questions on English rating scales, especially some medical terms. Whereas most of the physicians, nurses and social workers working with children in the United State don't speak Chinese. There is a dearth of professionals to explain these questions to Chinese-American parents. This language problem could have an enormous influence in the assessment and diagnosis of autism within Chinese American families. The present study will help Chinese parents who live in the USA to rate their children being evaluated for autism spectrum disorders on the CARS2-QPC and GARS-2 with increased accuracy. Thus their reports can more accurately guide professionals' diagnoses. Second, with China's large population and increasing middle class, there will be increasing interest in obtaining diagnoses for children with developmental difficulties and hopefully, gradual increases in the support and educational services available for these children. As services increase, educational and government systems will begin to develop screening and gate keeping mechanisms to decide which individuals will be eligible for services. Screening and diagnostic measures for autism spectrum disorders in China will continue be in

demand. With the increase in Chinese population and special educational services, valid and reliable autism measures in Chinese will be required. The present study has established a first step in developing empirically valid and reliable autism measures in Chinese. Although the present instruments have not been finalized, the current versions are a sound beginning for the development of empirically valid and reliable Chinese language autism screening instruments for research and practice.

## CHAPTER V

### SUMMARY

The focus of this study was to begin the validation process of developing two autism measures to be used in Chinese-speaking population living in America or China. This study used two existing valid and reliable American measures of autism – the Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) and the Gilliam Autism Rating Scale–Second Edition (GARS-2). These instruments were translated into Mandarin Chinese and back-translation was used to support the accuracy of translation. The concurrent validity of the Chinese translations of CARS2-QPC and GARS-2 was determined by comparing scores from a sample of Chinese and English speaking bilinguals. The results indicate that the Chinese translations of CARS2-QPC and GARS-2 do measure what they were intended to evaluate. The results of assessment of internal consistency indicate that the Chinese CARS2-QPC and GARS-2 have a good internal consistency. The results of this study contribute to the literature on valid and reliable measures of autism in Chinese.

This study has a number of limitations, which will be kept into consideration when conducting future study. They include: (1) small sample size; (2) utilization of non-clinical sample; (3) restricted educational range of the sample; and 4) limited age range of participants.

Additional aspects of future study on the Chinese CARS2-QPC and GARS-2 are proposed. The main recommendation is to continue validation research of the Chinese CARS2-QPC and the Chinese GARS-2, using larger and more diverse samples and including participants with clinically significant characteristics of autism.



Finally, it is important to remember that this study was developed as a first step in a bigger research project and a future line of research to develop valid and reliable Chinese language assessment tools for the autism spectrum.

In summary, the statistical analyses of this study indicate that the Chinese versions of CARS2-QPC and GARS-2 are valid instruments for measuring characteristics of autism spectrum disorders. Continued research on the psychometric properties of these instruments is of critical importance. However, the current study suggests that these instruments are appropriate for beginning use in clinical and research settings. In addition, since CARS2-QPC and GARS-2 have not yet been used in China, this study begins a data pool on the Chinese CARS2-QPC and GARS-2.

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APPENDIX A

Informed Consent Form

Informed Consent Form

Project Number \_\_\_\_\_

Researchers: Nannan Li

Myra Beth Bundy, Ph.D.

Eastern Kentucky University

As a graduate student in general psychology at Eastern Kentucky University, I am conducting research study for my Master's degree project. I appreciate your participation in this study. Your involvement in this project is strictly voluntary and you will be free to refuse or stop at any time without penalty. Your responses to questions will be held strictly confidential, and your name will not appear on any of the questionnaires.

Your participation in this study will require approximately 60 minutes of your time and will require you to complete two Chinese and two English questionnaires about your child's behavior. After you complete the session, you will be given an explanation of this study.

If you wish to participate in this study and all of your questions have been answered, please sign below.

Printed Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Investigator: \_\_\_\_\_

Date: \_\_\_\_\_

APPENDIX B

Demographic Information Form

Demographic Information Form

Project Number \_\_\_\_\_

Researches: Nannan Li

Myra Beth Bundy, Ph.D.

Eastern Kentucky University

Please **fill in the blank or circle** the appropriate answer:

1. Your Age: \_\_\_\_\_

2. Year of Birth (yyyy) \_\_\_\_\_

3. Gender: Male / Female

4. Education: high school / some college / college / graduate school /

5. Occupation: \_\_\_\_\_

6. How long you have been living in the US: \_\_\_\_\_

7. Age of your child (as reported on for this study) \_\_\_\_\_

8. Gender of your child: Male/Female

APPENDIX C

Debriefing Form

## Debriefing Form

This research project studies a couple of psychological checklists for autism. Autism is highly variable neurodevelopmental disorder that first appears during infancy or childhood, and generally follows a steady course without remission. The prevalence of autism is an approximate of 1 per 110 children in the United States is diagnosed with ASD in 2011. The number of people diagnosed with autism has increased dramatically since the 1980s. Also, in the two or more decades since autism was first diagnosed in China, a growing number of doctors have begun to recognize and diagnose autism in children. In China, there is only a limited amount of research literature on applications of different autism measures. Because a dearth of scientific literature in China regarding the diagnostic features and treatment of autism in comparison to Western societies, it is important to develop valid and reliable versions of autism measures for use with Chinese parents living in the United States or China.

This study was designed to evaluate the Questionnaire for Parents or Caregivers of Childhood Autism Rating Scale – Second Edition (CARS2-QPC) and Gilliam Autism Rating Scale–Second Edition (GARS-2) for use with Chinese-speaking individuals. The English versions of the CARS2-QPC and GARS-2 have been demonstrated to be good (valid and reliable) measures of autism respectively. By comparing Chinese and English versions of the each questionnaire (correlating their scores), we will be able to evaluate whether the Chinese translations are as good as original English versions and whether they can be recommended for use with Chinese-speaking individuals.

Thank you again for your participation. If you have any other questions about this research project, or would like information about the results we obtained, please contact

Dr. Bundy: Myrabeth.bundy@eku.edu, or come by her office in the Cammack building on the Eastern Kentucky University campus after May, 2012. Further, if you would like a written summary of the study along with the results, please give your name and address (or e-mail address) to the investigator. A written summary will be mailed to you once the study has been completed.

## APPENDIX D

The original English Questionnaire for Parents or Caregivers of Childhood

Autism Rating Scale – Second Edition (CARS2-QPC)



**Questionnaire for Parents or Caregivers**  
(to be used with the CARS2-ST or CARS2-HF)

G. Janette Weisman, Ph.D., Eric Schopler, Ph.D., Mary E. Van Bourgondien, Ph.D., and Steven R. Love, Ph.D.



**CARS2-QPC**

Date: \_\_\_\_\_ Date of birth of person to be rated: \_\_\_\_\_

Case ID Number: \_\_\_\_\_ Name of person to be rated: \_\_\_\_\_

Your name: \_\_\_\_\_ Your relationship to the person to be rated: \_\_\_\_\_

**INSTRUCTIONS**

This form asks about behaviors in several areas where people may have difficulty. The person you are rating may or may not have ever shown these behaviors.

For each behavior listed, please make a check mark under the description that best describes the person you are rating. Check the box under *Don't Know* if you do not have enough information about a behavior to give a rating. It is important to provide an answer for every behavior. After each section, there is space for you to give one or more brief, specific examples that relate to your ratings in that section. Use the blank page at the end of the form if you need extra space. The final section of this questionnaire provides spaces where you can describe any other behaviors that you would like us to know about.

**SECTION 1**

How does the person you are rating communicate?

Not a Problem  
(Does very well)

Mild to Moderate Problem  
(Sometimes a problem)

Severe Problem  
(Often or always a problem)

Not a problem now,  
but was in the past

Don't know

1. Imitates sounds, words, and movements of others .....  .....  .....  .....  .....
2. Responds to facial expressions, gestures, and different tones of voice used by others .....  .....  .....  .....  .....
3. Responds to his or her name being called by turning and making eye contact with the person calling his or her name .....  .....  .....  .....  .....
4. Directs facial expressions to others to show the emotions he or she is feeling .....  .....  .....  .....  .....
5. Uses a variety of gestures (pointing, nodding the head, showing the size of something) that are coordinated with words or used to explain things when he or she doesn't have the words to do so .....  .....  .....  .....  .....

If the person you are rating is not using words, skip ahead to Section 2.

6. Uses made-up words or repeats specific words or phrases .....  .....  .....  .....  .....
7. Has an unusual tone, rhythm, loudness, or rate of speech .....  .....  .....  .....  .....
8. Speech is overly formal; for example, uses vocabulary that seems more sophisticated than usual for a person of his or her age or for the situation .....  .....  .....  .....  .....
9. Carries on a conversation with another person that flows back and forth, at a level you would expect for someone of his or her age .....  .....  .....  .....  .....
10. Can talk with another person about that person's interests .....  .....  .....  .....  .....

**Examples:** Give one or more brief but specific examples of the problem behaviors rated above. If you need more space to write, use the blank page at the end of this form.

continue on next page...

**SECTION 2**

How does the person you are rating relate to others and show emotion?

	Not a Problem (Does very well)	Mild to Moderate Problem (Sometimes a problem)	Severe Problem (Often or always a problem)	Not a problem now, but was in the past	Don't know
1. Makes eye contact when speaking with or listening to another person .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Points to and shares things of interest with others .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Follows another person's gaze or points toward an object that is out of reach .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is responsive to social initiations from others .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Initiates social interactions with adults and peers (not just to get a basic need met) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Sustains an interaction with others in an easy, flowing, back-and-forth manner .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Makes and maintains friendships with peers of same developmental level .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Shows a range of emotional expressions that match the situation (for example, smiles, frowns, conveys different emotions through eyes and facial expressions, etc.) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Understands and responds to how another person may be thinking or feeling (for example, tries to comfort someone in distress, does something because he or she thinks the other person will like it) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Examples:** Give one or more brief but specific examples of the problem behaviors rated above. If you need more space to write, use the blank page at the end of this form.

continue on next page..

**SECTION 3**

How does the person you are rating move his or her body?

	No Problem (Doesn't exist)	Mild to Moderate Problem (Sometimes a problem)	Severe Problem (Often or always a problem)	Not a problem now, but was in the past	Don't Know
1. Has unusual ways of moving fingers, hands, arms, legs; or spins or rocks body .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does things that might result in self-injury, like scratching, head banging, picking at his or her skin .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is clumsy, stumbles, or has an awkward walk or run .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. For school-aged children or adults: Has difficulty tying shoes or difficulty with handwriting or other tasks that require fine motor coordination .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 4**

How does the person you are rating play?  
(For an older individual, how did he or she play as a child?)

	No Problem (Doesn't exist)	Mild to Moderate Problem (Sometimes a problem)	Severe Problem (Often or always a problem)	Not a problem now, but was in the past	Don't Know
1. Uses only parts of toys instead of whole toys, or plays with objects (e.g., opens and closes toy barn doors, spins wheels on cars, wobbles or spins household objects) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Plays with the same things in the same way over and over .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Uses toys or other materials to represent something they are not (e.g., uses a banana as a phone or a microphone) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Engages in make-believe play, taking on a role (not based on scripts from movies or TV shows) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Examples:** Give one or more brief but specific examples of the problem behaviors rated above. If you need more space to write, use the blank page at the end of this form.

*continue on next page...*

**SECTION 5**

How does the person you are rating react to new experiences and changes in routine?

Not a Problem  
(Does not exist)

Mild to Moderate Problem  
(Sometimes a problem)

Severe Problem  
(Often or always a problem)

Not a problem now,  
but was in the past

Don't know

- 1. May show anxiety or worry in facial expression or body movement, or by becoming overly impatient .....  .....  .....  .....  .....
- 2. May show worry about the same thing over and over again .....  .....  .....  .....  .....
- 3. Copes with changes in routine or the environment (for example, moving furniture) .....  .....  .....  .....  .....
- 4. Has specific routines or specific ways things must be done by self or others .....  .....  .....  .....  .....
- 5. Has special interests or topics (for example, dinosaurs, trains, clocks, weather, license plates) .....  .....  .....  .....  .....

**SECTION 6**

How does the person you are rating use his or her senses of vision, hearing, touch, and smell?

- 1. Tends to look at objects from unusual angles or out of the corner of his or her eyes .....  .....  .....  .....  .....
- 2. Is overly interested in light from mirrors or light reflecting off objects .....  .....  .....  .....  .....
- 3. Is overly sensitive to some sounds, smells, or textures; seeks some out, actively avoids others .....  .....  .....  .....  .....
- 4. Has an unusual response to touch; may overreact to touch or pain or may not respond to things that others would find uncomfortable or painful .....  .....  .....  .....  .....

**Examples:** Give one or more brief but specific examples of the problem behaviors rated above. If you need more space to write, use the blank page at the end of this form.

continue on next page...

**SECTION 7**

**Other Behaviors**

1. Does this individual have any extremely unusual mathematical, reading, or artistic abilities?    No    Yes (please explain)

2. Are there other unusual behaviors you have noticed that you would like to tell us about?  
Please list the specific behavior, and give an example or two.

**Additional Behavior Examples or Comments:**

Please specify the number of the question that is related to your example or comment: \_\_\_\_\_

**Additional Behavior Examples or Comments:**

Please specify the number of the question that is related to your example or comment: \_\_\_\_\_

**Additional Behavior Examples or Comments:**

Please specify the number of the question that is related to your example or comment: \_\_\_\_\_

## APPENDIX E

The original English Gilliam Autism Rating Scale–Second Edition (GARS-2)

# GARS-2

Gilliam Autism Rating Scale-Second Edition

Summary/Response Booklet



## Section I. Identifying Information

Individual's Name \_\_\_\_\_ Male  Female  Grade \_\_\_\_\_  
 \_\_\_\_\_  
 Year Month Day School \_\_\_\_\_  
 Date of Rating \_\_\_\_\_ Rater's Name \_\_\_\_\_  
 Date of Birth \_\_\_\_\_ Examiner's Name \_\_\_\_\_  
 Age \_\_\_\_\_ Examiner's Title \_\_\_\_\_

## Section II. Score Summary

Subscales	Raw Score	Standard Score	%ile	SEM
Stereotyped Behaviors	_____	_____	_____	1
Communication	_____	_____	_____	1
Social Interaction	_____	_____	_____	1
Sum of Standard Scores	_____			
Autism Index	<input type="text"/>	<input type="text"/>		4

## Section IV. Profile of Scores

Standard Score	Subscales			Autism Index
	Stereotyped Behaviors	Communication	Social Interaction	
20	*	*	*	150
19	*	*	*	145
18	*	*	*	140
17	*	*	*	135
16	*	*	*	130
15	*	*	*	125
14	*	*	*	120
13	*	*	*	115
12	*	*	*	110
11	*	*	*	105
10	*	*	*	100
9	*	*	*	95
8	*	*	*	90
7	*	*	*	85
6	*	*	*	80
5	*	*	*	75
4	*	*	*	70
3	*	*	*	65
2	*	*	*	60
1	*	*	*	55

## Section III. Interpretation Guide

Subscale Standard Score	Autism Index	Probability of Autism
7 or Higher	85 or Higher	Very Likely
4 to 6	70 to 84	Possibly
1 to 3	69 or Less	Unlikely

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3 4 7 8 9 10 14 15 12 11 10

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## Section V. Individual Item Responses

### Subscale 1: Stereotyped Behaviors

**Directions:** Rate the following items according to the frequency of occurrence. Use the following guidelines for your ratings:

- 0 Never Observed—You have never seen the individual behave in this manner.
- 1 Seldom Observed—Individual behaves in this manner 1–2 times per 6-hour period.
- 2 Sometimes Observed—Individual behaves in this manner 3–4 times per 6-hour period.
- 3 Frequently Observed—Individual behaves in this manner at least 5–6 times per 6-hour period.

Circle the number that best describes your observations of the individual's typical behavior under ordinary circumstances (i.e., in most places, with familiar people, and in usual daily activities). Remember to rate every item. If you are uncertain about how to rate an item, delay the rating and observe the individual for a 6-hour period to determine your rating. **REMEMBER, EVERY ITEM SHOULD RECEIVE A SCORE.**

	Never Observed	Seldom Observed	Sometimes Observed	Frequently Observed				
1. Avoids establishing eye contact; looks away when eye contact is made.	0	1	2	3				
2. Stares at hands, objects, or items in the environment for at least 5 seconds.	0	1	2	3				
3. Flicks fingers rapidly in front of eyes for periods of 5 seconds or more.	0	1	2	3				
4. Eats specific foods and refuses to eat what most people usually will eat.	0	1	2	3				
5. Licks, tastes, or attempts to eat inedible objects (e.g., person's hand, toys, books).	0	1	2	3				
6. Smells or sniffs objects (e.g., toys, person's hand, hair).	0	1	2	3				
7. Whirls, turns in circles.	0	1	2	3				
8. Spins objects not designed for spinning (e.g., saucers, cups, glasses).	0	1	2	3				
9. Rocks back and forth while seated or standing.	0	1	2	3				
10. Makes rapid lunging, darting movements when moving from place to place.	0	1	2	3				
11. Prances (i.e., walks on tiptoes).	0	1	2	3				
12. Flaps hands or fingers in front of face or at sides.	0	1	2	3				
13. Makes high-pitched sounds (e.g., eee-eee-eee-eee) or other vocalizations for self-stimulation.	0	1	2	3				
14. Slaps, hits, or bites self or attempts to injure self in other ways.	0	1	2	3				
Subtotals	—	+	—	+	—	+	—	=
<b>Stereotyped Behaviors Total Raw Score</b>								<input type="text"/>

**Section V. Continued.**

**Subscale 2: Communication**

**Directions:** Rate the following items according to the frequency of occurrence. Use the following guidelines for your ratings:

- 0 Never Observed—You have never seen the individual behave in this manner.
- 1 Seldom Observed—Individual behaves in this manner 1-2 times per 6-hour period.
- 2 Sometimes Observed—Individual behaves in this manner 3-4 times per 6-hour period.
- 3 Frequently Observed—Individual behaves in this manner at least 5-6 times per 6-hour period.

Circle the number that best describes your observations of the individual's typical behavior under ordinary circumstances (i.e., in most places, with familiar people, and in usual daily activities). Remember to rate every item. If you are uncertain about how to rate an item, delay the rating and observe the individual for a 6-hour period to determine your rating. **REMEMBER, EVERY ITEM SHOULD RECEIVE A SCORE.**

	Never Observed	Seldom Observed	Sometimes Observed	Frequently Observed				
How does this individual communicate? Talks ____ Signs ____ Does not Talk or Sign ____								
If the individual does not talk, sign, or use any other form of communication, omit this subscale.								
15. Repeats (echoes) words verbally or with signs.	0	1	2	3				
16. Repeats words out of context (i.e., repeats words heard at an earlier time; e.g., repeats words heard more than 1 minute earlier).	0	1	2	3				
17. Repeats words or phrases over and over.	0	1	2	3				
18. Speaks or signs with flat tone, affect, or dysrhythmic patterns.	0	1	2	3				
19. Responds inappropriately to simple commands (e.g., "sit down," "stand up").	0	1	2	3				
20. Looks away or avoids looking at speaker when name is called.	0	1	2	3				
21. Does not ask for things he or she wants.	0	1	2	3				
22. Does not initiate conversations with peers or adults.	0	1	2	3				
23. Uses "yes" and "no" inappropriately. Says "yes" when asked if he or she wants an aversive stimulus, or says "no" when asked if he or she wants a favorite toy or treat.	0	1	2	3				
24. Uses pronouns inappropriately (e.g., refers to self as "he," "you," "she").	0	1	2	3				
25. Uses the word <i>I</i> inappropriately (e.g., does not say "I" to refer to self).	0	1	2	3				
26. Repeats unintelligible sounds (babbling) over and over.	0	1	2	3				
27. Uses gestures instead of speech or signs to obtain objects.	0	1	2	3				
28. Inappropriately answers questions about a statement or brief story.	0	1	2	3				
Subtotals	_	+	_	+	_	+	_	=
<b>Communication Total Raw Score</b>								

**Section V. Continued.**

**Subscale 3: Social Interaction**

**Directions:** Rate the following items according to the frequency of occurrence. Use the following guidelines for your ratings:

- 0 Never Observed—You have never seen the individual behave in this manner.
- 1 Seldom Observed—Individual behaves in this manner 1-2 times per 6-hour period.
- 2 Sometimes Observed—Individual behaves in this manner 3-4 times per 6-hour period.
- 3 Frequently Observed—Individual behaves in this manner at least 5-6 times per 6-hour period.

Circle the number that best describes your observations of the individual's typical behavior under ordinary circumstances (i.e., in most places, with familiar people, and in usual daily activities). Remember to rate every item. If you are uncertain about how to rate an item, delay the rating and observe the individual for a 6-hour period to determine your rating. **REMEMBER, EVERY ITEM SHOULD RECEIVE A SCORE.**

	Never Observed	Seldom Observed	Sometimes Observed	Frequently Observed
29. Avoids eye contact; looks away when someone looks at him or her.	0	1	2	3
30. Stares or looks unhappy or unexcited when praised, humored, or entertained.	0	1	2	3
31. Resists physical contact from others (e.g., hugs, pats, being held affectionately).	0	1	2	3
32. Does not imitate other people when imitation is required or desirable, such as in games or learning activities.	0	1	2	3
33. Withdraws, remains aloof, or acts standoffish in group situations.	0	1	2	3
34. Behaves in an unreasonably fearful, frightened manner.	0	1	2	3
35. Is unaffectionate; does not give affectionate responses (e.g., hugs and kisses).	0	1	2	3
36. Shows no recognition that a person is present (i.e., looks through people).	0	1	2	3
37. Laughs, giggles, cries inappropriately.	0	1	2	3
38. Uses toys or objects inappropriately (e.g., spins toy cars, takes action toys apart).	0	1	2	3
39. Does certain things repetitively, ritualistically.	0	1	2	3
40. Becomes upset when routines are changed.	0	1	2	3
41. Responds negatively or with temper tantrums when given commands, requests, or directions.	0	1	2	3
42. Lines up objects in precise, orderly fashion and becomes upset when the order is disturbed.	0	1	2	3

Subtotals           +      +      +      =

**Social Interaction Total Raw Score**

## Section VI. Parent Interview

This section should be completed by parents or other caregivers who have direct, sustained contact with the individual. Parent and caregiver interviews are acceptable. Answer each question by recording either *yes* or *no*. Complete every item.

### Delays in:

#### Social Interaction

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

##### During the child's first 3 years of life:

- Did the child reach out or prepare to be picked up when the parent attempted to lift the child?
- Did the child cry or become upset when left unattended in his or her crib, playpen, or other area?
- Did the child cry or become upset when picked up or held?
- Did the child cry or become upset when handed from one adult to another?
- Did the child attempt to join family members in group activities (e.g., watching TV)?

#### Language Used in Social Communication

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

##### During the child's first 3 years of life:

- Did the child use single words by 16 months of age?
- Did the child use meaningful, communicative phrases by age 2?
- Did the child develop normally in terms of language (i.e., cooing, babbling, and speaking without any interruption or regression)?
- Did the child follow directions (i.e., appear to understand what to do when told to do something)?
- Did the child appear to have normal hearing?

### Abnormal Functioning in:

#### Social Interaction

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

##### During the child's first 3 years of life:

- Did the child smile at parents or siblings when smiled at or played with?
- Did the child cry when approached by unfamiliar persons during the first year?
- Did the child engage in imitative play before age 3 (e.g., played pat-a-cake, peekaboo)?
- Did the child seem to be involved and responsive to people?
- Did the child prefer to spend time in the company of others?

#### Language Used in Social Communication

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

##### During the child's first 3 years of life:

- Did the child respond to his or her name when called (e.g., turn and look at the person)?
- Did the child ask for things or use gestures to communicate what he or she wanted?
- Did the child follow simple directions (e.g., "come here," "give me a hug," "wave bye-bye")?
- Did the child appear to understand what to do when told to do something?
- Did the child indicate (show facial concern) when a parent or sibling cried or was distressed?

#### Symbolic or Imaginative Play

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

##### During the child's first 3 years of life:

- Did the child engage in pretend play (e.g., play with dolls, action heroes, toy animals appropriately)?
- Did the child pretend he or she was someone else (e.g., Mommy or Daddy, action hero)?
- Did the child pretend that an object was something else? For example, did the child pretend that a broomstick was a horse and place the broomstick between his or her legs and pretend to be riding a horse?
- Did the child pretend that he or she had an imaginary friend or animal?
- Did the child play with dolls pretending that they were real persons?

The purpose of Section VI is to document whether the individual meets a set of diagnostic criteria from *DSM-IV-TR*. If you checked *No* to any question in this section, the individual meets criteria for delays or abnormal functioning.

### Section VII. Key Questions

The following questions are designed to help the examiner reach a diagnostic conclusion. The examiner should consider these questions as he or she interprets the GARS-2 results.

1. What behaviors does the individual display that causes you to think that he or she has autism? Describe these behaviors as specifically as you can.  
\_\_\_\_\_  
\_\_\_\_\_
2. When did these behaviors first occur? They should have occurred before the age of 36 months.  
\_\_\_\_\_
3. Does the behavior occur in all settings? The individual should demonstrate the behaviors in all settings and in the presence of all people, not in specific places only and when specific people are present.  
\_\_\_\_\_  
\_\_\_\_\_
4. Could the behavior be the result of another disabling condition? Have other diagnoses been ruled out? How?  
\_\_\_\_\_
5. Who has evaluated the individual and what were the results? Has the individual been evaluated by persons qualified to make a diagnosis (e.g., a psychologist, psychiatrist, speech pathologist, autism specialist)?  
\_\_\_\_\_
6. What assessments or evaluations have been done besides the GARS-2? Has the individual been given an individual battery of tests (e.g., intelligence test, academic achievement test, language test)?  
\_\_\_\_\_
7. Are impairments noted in all three areas of the definition of autism (i.e., stereotyped behaviors, communication, and social interaction)?  
\_\_\_\_\_
8. What diagnostic areas are most affected? What are the symptoms?  
\_\_\_\_\_
9. How severe are the symptoms? How do the symptoms interfere with normal functioning?  
\_\_\_\_\_
10. What other information needs to be collected? Who can supply the information?  
\_\_\_\_\_
11. What resources are available for further evaluation?  
\_\_\_\_\_  
\_\_\_\_\_



## Section IX. GARS-2 Characteristics

---

**Description.** The *Gilliam Autism Rating Scale-Second Edition* is a standardized instrument designed for assessment of persons with autism and other severe behavioral disorders. The GARS-2 provides norm-referenced information that can assist in the diagnosis of autism.

**Item Selection.** Items on the GARS-2 are based on the definitions of autism adopted by *DSM-IV-TR* (American Psychiatric Association, 2000) and the Autism Society of America (2003).

**Normative Data.** The GARS-2 was standardized on a sample of 1,107 individuals with autism from 48 states within the United States.

**Reliability.** Internal consistency of the GARS-2 was determined using Cronbach's alpha technique. Studies revealed coefficients alpha of .84 for Stereotyped Behaviors, .86 for Communication, .88 for Social Interaction, and .94 for the Autism Index. These reliability coefficients are very large and indicate that the items within the subscales are consistent in the measurement of characteristic behaviors of persons with autism and other serious behavioral disorders. All of the items are sufficiently reliable for contributing to important diagnostic decisions.

**Validity.** The validity of the GARS-2 was demonstrated through several research studies. Item analysis of each subscale established that GARS-2 subscale items are very consistent and discriminative. Concurrent criterion-related validity studies demonstrated that scores from the GARS-2 can be used to identify individuals who belong to different diagnostic groups. Other evidence of concurrent validity was established by correlating scores on the GARS-2 with scores from the Autism Behavior Checklist (Krug, Arick, & Almond, 1993). Positive correlations were obtained between relevant subtests on these two instruments. Positive prediction analyses demonstrated the ability of the GARS-2 to discriminate persons with autism from children who have mental retardation, children with multiple disabilities, and children without disabilities.

## APPENDIX F

The back-translated English Questionnaire for Parents or Caregivers of Childhood

Autism Rating Scale – Second Edition (CARS2-QPC)



**a Questionnaire for Parents or Caregivers**

**(be used with the CARS2-ST or CARS2-HF)**

G. Janette Wellman, Ph.D., Eric Schopler, Ph.D., Mary E. Van Bourgondien, Ph.D., and Steven R. Love, Ph.D.

<b>b</b> Date:		<b>c</b> Date of birth of person to be rated:	
<b>d</b> Case ID Number:		<b>e</b> Name of person to be rated:	
<b>f</b> Rater's Name:		<b>g</b> Rater's relationship to the person to be rated:	

**h INSTRUCTIONS**

This questionnaire asks questions about some problem situations, which the person being rated may or may not have encountered.

If the person being rated is best described by a behavioral situation listed, please check the box under the description. If you are not sure to rate a behavior, please put a check mark under "Don't Know". Every question shall be answered completely. There is space provided at the end of each section, which is for you to briefly share relevant examples to your previous behavior ratings. The last page of this questionnaire is left blank. Feel free to use it, if you need extra space. The last section gives you a chance to talk about any other behavioral situations that you may want to bring to our attention.

**SECTION 1**

**i. How the subject communicates with others**

		j	k	l	m	n
		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	Mimics voices, languages and actions of others.					
2.	Reacts to facial motions, body gestures and tones of the voices of others.					
3.	When called, she/he turns her/his head and has eye contact with you.					
4.	Directly shows her/his emotion with facial expressions.					
5.	Express her/his feelings with a variety of body languages (Point, Nod, hands and arm).					

**o. If no language communication, skip this section, and go to section 2.**

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
6.	Repeatedly uses specific words or phrases created by her/him-self.					
7.	Abnormal tone, rhythm, volume or speech speed.					
8.	Conversation over-formal or with over-complicated words.					
9.	Normal fluent conversations with the same age group.					
10.	Starts a conversation with a topic interesting to both parties.					

**p. Examples:** Please briefly give one or two relevant examples to your previous behavior ratings. The last page of this questionnaire is left blank. Feel free to use it, if you need extra space.

**SECTION 2**

q. How the subject communicates with others and expresses themselves?

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	Conversation with eye contact.					
2.	Points out interesting things and shares with others.					
3.	Recognizes distant objects by following others' eye or finger movement.					
4.	Prompts reaction to social communications.					
5.	Positive communication with adults or the same age group.					
6.	Keeps in touch with others back and forth with simple good rapport.					
7.	Establishes and maintains friendships within the peer group.					
8.	Expresses a series of emotions that are related to the scenes (smile, frown, eye contact, facial motion, etc.).					
9.	Understands and reacts to the thoughts or feelings of others (when others is hurt, tries to comfort others, or tries to please.					

Examples: Please briefly give one or two relevant examples to your previous behavior ratings. The last page of this questionnaire is left blank. Feel free to use it, if you need extra space.

### SECTION 3

#### r How the subject moves her/his body?

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	Abnormal movements (fingers, hands, limbs, turning body within a circle or rocking back and forth).					
2.	Activities that would induce self-inflicted injuries (scratch, bang his head, pinch his skin).					
3.	Walking and running are clumsy (clumsy walking and running), jerky and of inconsistent motion.					
4.	For School kids or adults: difficulties with activities that need body parts in good coordination: tying shoe laces, hand writing.					

### SECTION 4

#### s How he/ she plays like a child?

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	Only plays with one part of the toy, not the entire toy (opens and closes the door of a toy car, turns the wheel of a toy car, or shakes or spins home objects).					
2.	Plays with the same toy in the same manner repeatedly.					
3.	Uses a toy or object to present a non-related thing (takes a banana as a cellular phone or microphone).					
4.	Likes to play a role in a 'happy families' game.					

Examples: Please briefly give one or two relevant examples to your previous behavior ratings. The last page of this questionnaire is left blank. Feel free to use it, if you need extra space.

**SECTION 5**

**t. How the subject copes with new environment or changing of usual environment.**

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	May show anxiety, uneasiness with facial motions or body languages.					
2.	May worry the same thing again and again.					
3.	Cope with changing of routine or the environment.					
4.	Has specific routine or ways that something must done by self or others.					
5.	Has special interests or topics (such as Dinosaurs, trains, weather, License plates).					

**SECTION 6**

**u. How the subject uses his/her visual, audio, touch and smell sensations.**

		No problem (Does very well)	Mild to moderate (Occasionally has problem)	Sever (Often or always has problem)	Doesn't have now but happened in the past	Do not know
1.	Tries to look at something from unusual angles.					
2.	Over-attention to reflected light from a mirror or some other objects.					
3.	Over-sensitive to some voices, smells or textures; seeks some out and actively avoids others.					
4.	Has an abnormal reaction to touch; over-reacts to touch, pain or not respond to things that others would feel uncomfortable or painful.					

Examples: Please briefly give one or two relevant examples to your previous behavior ratings. The last page of this questionnaire is left blank. Feel free to use it, if you need extra space.

**SECTION 7**

**v. Other Behaviors**

1. Does the subject have special math, reading or artistic abilities?  
(please explain) No    Yes

2. Do you notice any other abnormal behaviors?  
Please list them and give one or two examples.

**w. Examples of other behaviors or some other comments:**

x. Please indicate the question number corresponding to your example or comment: \_\_\_\_\_

**Examples of other behaviors or some other comments:**

Please indicate the question number corresponding to your example or comment: \_\_\_\_\_

**Examples of other behaviors or some other comments:**

Please indicate the question number corresponding to your example or comment: \_\_\_\_\_

## APPENDIX G

The back-translated English Gilliam Autism Rating Scale–Second Edition (GARS-2)

# GARS-2

Gilliam Autism Rating Scale – Second Edition

## a<sub>1</sub> Summary/Reply Booklet

### b<sub>1</sub> Section I. General Information

c<sub>1</sub> Name of person to be rated \_\_\_\_\_ d<sub>1</sub> Male \_\_\_ e<sub>1</sub> Female \_\_\_ f<sub>1</sub> Grade \_\_\_  
 g<sub>1</sub> \_\_\_\_\_ Year Month Day h<sub>1</sub> School \_\_\_\_\_  
 i<sub>1</sub> Date of Rating \_\_\_\_\_ j<sub>1</sub> Rater's name \_\_\_\_\_  
 k<sub>1</sub> Date of Birth of person to be rated \_\_\_\_\_ l<sub>1</sub> Examiner's Name \_\_\_\_\_  
 m<sub>1</sub> Age \_\_\_\_\_ n<sub>1</sub> Examiner's Title \_\_\_\_\_

### o<sub>1</sub> Section II. Score Summary

p <sub>1</sub> Subscales	q <sub>1</sub> Raw Score	r <sub>1</sub> Standard Score	s <sub>1</sub> %ile	t <sub>1</sub> SEM
u <sub>1</sub> Stereotyped Behaviors	___	___	___	1
v <sub>1</sub> Communication	___	___	___	1
w <sub>1</sub> Social Interaction	___	___	___	1
	x <sub>1</sub> Sum of Standard Scores	___		
	y <sub>1</sub> Autism Index	[ ]	[ ]	4

### z<sub>1</sub> Section III. Interpretation Guide

Subscale Standard Score	Autism Index	a <sub>2</sub> Probability of Autism
7 or Higher	85 or Higher	b <sub>2</sub> Very probably
4 to 6	70-84	c <sub>2</sub> Possibly
1 to 3	69 or Less	d <sub>2</sub> Impossibly



e<sub>2</sub> Section IV. Profile of Scores

Standard Score	Subscales			Autism Index
	Stereotyped Behaviors	Communication	Social Interaction	
20	.	.	.	150
19	.	.	.	145
18	.	.	.	140
17	.	.	.	135
16	.	.	.	130
15	.	.	.	125
14	.	.	.	120
13	.	.	.	115
12	.	.	.	110
11	.	.	.	105
10	.	.	.	100
9	.	.	.	95
8	.	.	.	90
7	.	.	.	85
6	.	.	.	80
5	.	.	.	75
4	.	.	.	70
3	.	.	.	65
2	.	.	.	60
1	.	.	.	55

f<sub>2</sub> Section V. Tested rating item responses

g<sub>2</sub> Subscale 1: Stereotyped Behaviors

h<sub>2</sub> Rating: according to the frequency of occurrence. Follow the guidelines to rate:

- 0 i<sub>2</sub> Never Observed – You have never seen the person to be rated have this kind of behavior.
- 1 j<sub>2</sub> Rarely Observed – The person to be rated has this kind of behavior 1-2 times per 6-hour period.
- 2 k<sub>2</sub> Occasionally Observed – The person to be rated has this kind of behavior 3-4 times per 6-hour period.
- 3 l<sub>2</sub> Often Observed – The person to be rated has this kind of behavior 5-6 times per 6-hour period.

m<sub>2</sub> Circle the number that best describes the typical behavior of the person to be rated under ordinary circumstances (for example, in most cases, with acquaintances, and in routine activities). **To bear in mind, every behavior listed shall be rated.** If you are not sure how to rate an item, please give your rating after a 6-hour period observing of the person to be rated.

	Never Observed	Rarely Observed	Occasionally Observed	Often Observed
1. Avoids eye contact. Looks away when someone establishes eye contact with him/her.	0	1	2	3
2. Looks intensely at hands, or nearby objects for at least 5 s.	0	1	2	3
3. Flicks finger rapidly in front of eyes for 5 s or more.	0	1	2	3
4. Eats specific foods and refuses to eat normal varied choices.	0	1	2	3
5. Licks, tastes, or attempts to eat something inedible (hands, toys, books).	0	1	2	3
6. Smells objects (toys, person's hand, hair).	0	1	2	3
7. Swirls, Turns body in circles.	0	1	2	3
8. Spins something which is not for spinning (saucers, cups, and glasses).	0	1	2	3
9. Rocks back and forth while seating or standing.	0	1	2	3
10. Makes rapid jumping, or lunging movements from one place to another.	0	1	2	3
11. Prances.	0	1	2	3
12. Flaps hands or fingers in front of face or at sides.	0	1	2	3
13. Makes high tune sounds or other vocalizations for self-stimuli.	0	1	2	3
14. Smacks, hits or bites self or attempts to injury self.	0	1	2	3
Subtotals	—	+	+	+
<b>Stereotyped Behaviors Total Raw Score</b>				[ ]

**V. Continued.**

**Subscale 2: Communication**

**Rating:** according to the frequency of occurrence. Follow the guidelines to rate:

- 0 Never Observed – You have never seen the person to be rated have this kind of behavior.
- 1 Rarely Observed – The person to be rated has this kind of behavior 1-2 times per 6-hour period.
- 2 Occasionally Observed – The person to be rated has this kind of behavior 3-4 times per 6-hour period.
- 3 Often Observed – The person to be rated has this kind of behavior 5-6 times per 6-hour period.

Circle the number that best describes the typical behavior of the person to be rated under ordinary circumstances (for example, in most cases, with acquaintances, and in routine activities). **To bear in mind, every behavior listed shall be rated.** If you are not sure how to rate an item, please give your rating after a 6-hour period observing of the person to be rated.

	Never Observed	Rarely Observed	Occasionally Observed	Often Observed
How does this person communicate? Speak _____ sign _____ no communicating _____				
If the object does not communicate, skip this section				
15. Repeats after another person verbally or with signs	0	1	2	3
16. Repeats words in past context	0	1	2	3
17. Repeats words or phrases over and over	0	1	2	3
18. Speaks or signs with a flat, tuneless, or non-melodious sound	0	1	2	3
19. Responds inappropriately to simple commands (sit down, stand up)	0	1	2	3
20. When name is called, looks away and avoids eye contact	0	1	2	3
21. Does not ask for something he/she wants	0	1	2	3
22. Does not begin conversations with peers or adults	0	1	2	3
23. Uses "yes" and "no" incorrectly. Says "yes" when asked if he/she wants unpleasant stimuli; or says "no" when asked if he/she wants a favorite toy or treats.	0	1	2	3
24. Uses pronouns incorrectly (refers to self as "he" "she" "you")	0	1	2	3
25. Cannot use "I" appropriately (does not use "I" to refer self)	0	1	2	3
26. Repeats unintelligible infant sound, (babbling) repeatedly	0	1	2	3
27. Uses gestures instead of speech to obtain objects	0	1	2	3
28. Cannot answer questions about a statement or brief story	0	1	2	3
Subtotals	—	+	—	+
<b>Communication Total Raw Score</b>				<b>1 1</b>

**Section V. Continued.**

**Subscale 3: Social Interaction**

**Rating:** according to the frequency of occurrence. Follow the guidelines to rate:

- 0 Never Observed – You have never seen the person to be rated have this kind of behavior.
- 1 Rarely Observed – The person to be rated has this kind of behavior 1-2 times per 6-hour period.
- 2 Occasionally Observed – The person to be rated has this kind of behavior 3-4 times per 6-hour period.
- 3 Often Observed – The person to be rated has this kind of behavior 5-6 times per 6-hour period.

Circle the number that best describes the typical behavior of the person to be rated under ordinary circumstances (for example, in most cases, with acquaintances, and in routine activities). **To bear in mind, every behavior listed shall be rated.** If you are not sure how to rate an item, please give your rating after a 6-hour period observing of the person to be rated.

	Never Observed	Rarely Observed	Occasionally Observed	Often Observed
29. Avoids eye contact, looks away when someone looks at him/her	0	1	2	3
30. Looks unhappy, unexcited or unaffected when praised, humored or entertained.	0	1	2	3
31. Resists physical contact with others (hugs, pats)	0	1	2	3
32. Cannot follow instructions to imitate others (in games, learning something)	0	1	2	3
33. Withdraws, remains aloof, no communication within groups	0	1	2	3
34. Behaves in a unreasonably fearful, frightened manner	0	1	2	3
35. Unaffectionate, dose not give affectionate response (hugs and kisses)	0	1	2	3
36. Ignores others present	0	1	2	3
37. Inappropriate laughs, giggles or cries	0	1	2	3
38. Cannot play with toys properly (spins toy cars, takes a toy apart)	0	1	2	3
39. Dose something repetitively and ritualistically	0	1	2	3
40. Upset when routines changed	0	1	2	3
41. Negative responses with temper when given commands, requests or instructions	0	1	2	3
42. Lines up objects in a precise order and becomes upset when it is disrupted	0	1	2	3
Subtotals	—	+	—	+
<b>Social Interaction Total Raw Score</b>				

**n<sub>2</sub> Section VI. Parent Interview**

0<sub>2</sub> This section ought to be completed by parents or caregivers who maintain a long-term relationship directly with the person being rated. Parent and caregiver interviews may be accepted. To answer the question, check either *Yes* or *No*. No question shall be unanswered.

**p<sub>2</sub> Delays in:**

**Social Interaction**

- Yes No      q<sub>2</sub> During the first three years of life:
- a. Did the child reach out to be picked up when the parent was going to lift the child?
  - b. Did the child cry when left alone in the crib, the play yard or some other place?
  - c. Did the child cry or was upset when picked up or held?
  - d. Did the child cry when handed from one adult to another?
  - e. Did the child like to join family activities (watching TV, for example)?

**r<sub>2</sub> Language used in social communication**

- Yes No      During the first three years of life
- a. Did the child speak single words by 16 months of age?
  - b. Did the child use meaningful, communicative phrases by age 2?
  - c. Did the child develop normally in language (babbling, or speaking without any interruption)?
  - d. Did the child follow directions (understand what to do when told to do something)?
  - e. Did the child seem to have normal hearing?

**s<sub>2</sub> Abnormal function in:**

**Social Interaction**

- Yes No      During the first three years of life:
- a. Did the child smile when parents or siblings smiled at or played with her/him?
  - b. Did the child cry when contacted by unfamiliar persons during the first year of life?
  - c. Did the child like imitative play before age 3 (Pat -a-cake, Peek boo)?
  - d. Did the child seem to be involved and responsive to others?
  - e. Did the child prefer to spend time with others?

**Language Used in Social Communication**

- Yes No      During the first three years of life
- a. Did the child respond when her/his name was called (turned head with eye contact)?
  - b. Did the child ask for things by language or gesture?
  - c. Did the child follow simple directions (come here; give me a hug, bye-bye)?
  - d. Did the Child understand what to do when told to something?
  - e. Did the child show his/her concern when a parent or sibling cried or upset?

**1<sub>2</sub> Symbolic or imaginative play:**

- |     |    |   |
|-----|----|---|
| Yes | No | During the first three years of life:   |
|     |    | a. Did the child like to engage in pretended play (play with dolls, action heroes, or toy animals, for example)   |
|     |    | b. Did the child pretend he/she was someone else (Mum, Dad or hero)?  |
|     |    | c. Did the child pretend that an object was something else? Take a broom was a horse and place the broomstick between legs and pretend to ride a horse? |
|     |    | d. Did the child pretend that he/she had an imaginary friend or animal?   |
|     |    | e. Did the child play with dolls pretending that they were real?  |

u<sub>2</sub> Section 6 by design is to record whether the person being rated meets a number of diagnostic criteria from *DSM-IV-TR*. Criteria for delays or abnormal functioning are met, if *No* is given as an answer in this section.

**v<sub>2</sub> Section VII. Key Questions**

w<sub>2</sub> Below are some questions designed to facilitate a diagnostic conclusion. These questions should go along with the interpretation of the GAR-2 results.

1. What behaviors does the subject display that make you think that he/she has autism? Describe these behaviors as specifically as you can.
  
2. When did these behaviors first occur? They should have occurred before 3 years old.
  
3. Does the behavior occur in all settings? The subject should demonstrate these behaviors in all settings and in front of all people, not in a specific place or in front of a specific person only.
  
4. Could the behavior be the result of another condition? Have other diagnoses been ruled out? How?
  
5. Who has evaluated the subject and what was the result? Has the subject been evaluated by specialist (psychologist, psychiatrist, speech pathologist, autism specialist)?
  
6. What assessment has been done besides the GARS-2? Has the subject been given an individual battery of tests (intelligence test, academic achievement test, language test)?
  
7. Are impairments noted in all three criteria for autism (stereotyped behaviors, communications and social interaction)?
  
8. What is the most impairment out of the three criteria? What are the symptoms?
  
9. How severe are these symptoms? How do the symptoms interfere with normal routine functions?
  
10. What other information needs to be collected? Who can supply the information?
  
11. What resources are available for further evaluation?

**x2 Section VIII. Interpretation and Recommendations**



## y<sub>2</sub> **Section IX. GARS-2 Characteristics**

z<sub>2</sub> **Description:** The Gilliam Autism Rating Scale-Second Edition is a standardized rating system designed to assess people with autism and other serious behavioral problems. GAR-2 gives norm-referenced information that helps to diagnose autism.

a<sub>3</sub> **Item Selection:** The GAR-2 items are selected based on the definitions of autism adopted by DSM-IV-TR (APA, 2000) and the ASA (2003).

b<sub>3</sub> **Normality of Data:** The GAR-2 was standardized based on the data of 1,107 autistic individuals from 48 US states.

c<sub>3</sub> **Reliability:** Cronbach's alpha technique was applied in determining the internal consistency of the GAR-2. The alpha coefficients reported in the literature were 0.84 for Stereotyped Behaviors, 0.86 for Communication, 0.88 for Social Interaction, and 0.94 for the Autism Index. The large magnitude of the coefficients implies the consistency of the items within the subscales in measuring people's characteristic behaviors with autism and other serious behavioral problems. Being largely reliable, all items help to reach important diagnostic inclusion.

d<sub>3</sub> **Validity:** There have been research results supporting the validity of the GAR-2. Item analysis suggests that GAR-2 subscale items are quite consistent and discriminative. Concurrent research on criterion-related validity shows that GAR-2 scores are applicable to different diagnostic groups for identification. Correlating GAR-2 scores with Autism Behavior Checklist scores, Krug et al. (1993) find positive correlations between relevant subsets, which are additional evidence of concurrent validity. Positive prediction analyses confirm that the GAR-2 is capable of discriminating autism from other conditions such as mental retardation, multiple disabilities, and no disabilities.

## APPENDIX H

The Chinese Questionnaire for Parents or Caregivers of Childhood

Autism Rating Scale – Second Edition (CARS2-QPC)

父母或看护人问卷  
(与标准儿童孤独症评定量表或高功能儿童孤独症评定量表一起用)

CARS2-QPC

检查日期: \_\_\_\_\_ 受测者生日: \_\_\_\_\_

病历号: \_\_\_\_\_ 受测者姓名: \_\_\_\_\_

您的姓名: \_\_\_\_\_ 您同受测者的关系: \_\_\_\_\_

#### 简介

此量表就某些可能有困难的行为表现提出一些问题。受测者可能曾经有也可能没有这些行为表现。

对于下列每一个行为,请在您认为最能描述受测者行为的表述后面标注。如果您没有足够的把握做出准确的评估请在“不清楚”选项下面标注。为每一个行为评估是非常重要的。在每一部分后面的空白区域,你可以给出一个或几个简洁、具体的与此部分评价相关的例子。如果你需要更多的空间请用此问卷的最后一页空白页。在此问卷的最后一部分你可以描述任何你想让我们了解的受测者的其他行为。

1

1

第一部分

受测者是如何与他人进行交流的？

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	模仿他人的声音、语言和动作					
2	对别人面部表情、姿势、和不同声调的反应					
3	有人叫他/她名字时能把头转向此人并用眼神交流					
4	能恰当地用面部表情向别人表达他/她的情绪和感受					
5	当他/她不知道该用什么词语去表达时会用各种各样的姿势(指点、点头、比划物体的大小)去辅助语言的表达或解释					

如果受测者不用语言交流，略过此部分直接做第二部分

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有但过去	不清楚
6	用自创的字词或重复特定的字词或短语					
7	有不正常的声调、节律、音量或语速					
8	说话过于正式；例如：相对于受测者的年龄或当时的情景而言，使用过于复杂的词汇					
9	与别人交谈时能很顺畅的有来有往，处于受测者年龄所应有的水平					
10	能够就双方都感兴趣的话题与他人进行聊天					

例子：就上述有问题的行为，给出一个或多个简洁但具体的例子。如果你需要更多的空白，请使用卷末的空白页。

2

2

第二部分

受测者如何与他人相处和表达情感？

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	与他人说话或听别人说话时有眼神交流					
2	指出感兴趣的事物并与其他人分享					
3	顺着别人的目光或指示看远处的事物					
4	对他人主动展开社交互动并有所回应					
5	主动展开与成人或同龄人的社交互动(不仅仅是为了索取东西或寻求满足基本需求)					
6	使用轻松的、顺畅的、有来有往的方式与他人保持互动					
7	与同龄人产生友谊并能维持下去					
8	表达一系列与情境相符的情感(例如:微笑, 皱眉, 通过眼神和面部表情传递不同的情感, 等等)					
9	理解并且回应他人可能有的想法或感受(例如: 当他人伤心痛苦时, 试图去安慰他人, 或者做一些他/她以为对方可能会喜欢的事情)					

例子: 就上述有问题的行为, 给出一个或多个简洁但具体的例子。如果你需要更多的空白, 请使用卷末的空白页。

3

3

第三部分

受测者的肢体运动如何？

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	用异常的方式动手指，手，胳膊，腿；或旋转，摇摆身体					
2	做出一些可能伤害自己的事情，例如：抓挠，撞头，掐自己的皮肤					
3	行为笨拙，刻板，或以一种别扭的方式走或跑					
4	学龄儿童或成人：对系鞋带，书写等需要良好的协调性的任务有困难					

第四部分

受测者如何玩耍？

(对于年龄稍大的，作为孩子他/她怎样玩耍？)

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	只玩玩具的某一部分而不是整个玩具，或玩一些其它东西（例如：开合玩具车的门，旋转玩具车的轮子，摇晃或旋转家用物品）					
2	反复不停地用同一种方式玩同一个东西					
3	用玩具或别的物体去表示一个毫不相关的东西（例如：把香蕉当成手机或话筒）					
4	喜欢玩过家家，扮演角色（不仅仅是模仿电影或电视秀的角色剧情，也包括假扮厨师或售货员等等生活中的角色场景）					

例子：就上述有问题的行为，给出一个或多个简洁但具体的例子。如果你需要更多的空白，请使用卷末的空白页。

4

4

第五部分

受测者对新体验或常规的改变反应如何？

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	可能会在面部表情或肢体动作上表现出不安或忧虑，或变得极其不耐烦					
2	可能反复不停地担心同一事情					
3	能够应付惯例常规或环境的改变(例如：移动家具)					
4	有一些自己的固定或特殊的行为方式并且要求他人也这样做					
5	有特殊的兴趣爱好或话题(例如：恐龙、火车、天气、汽车牌)					

第六部分

受测者的视觉、听觉、触觉和嗅觉如何？

		没有问题 (做得非常好)	轻度至中度 (有时有问题)	重度 (经常或总是有问题)	曾出现过类似问题 目前没有问题但过去	不清楚
1	试图用非常规的角度或眼睛的余光去看东西					
2	过分专注于从镜子或别的事物反射出的光					
3	对某些声音、气味或质地过分地敏感；主动地去找或刻意地去避开这些					
4	对触觉有异常的反应；可能对某些触觉或疼痛反应过度，或者对别人觉得不舒服或疼痛的触觉没反应					

例子：就上述有问题的行为，给出一个或多个简洁但具体的例子。如果你需要更多的空白，请使用卷末的空白页。

5

5

第七部分

其他的行为表现

1. 受测者是否有任何极其特殊的能力如数学，阅读，或艺术？ 是 否（请解释）

2. 你是否有其他你所注意到的异常行为想告诉我们？  
请在此列出特殊的行为表现并给出一两个例子。

其他行为表现的例子或说明：  
请标明与你的例子或说明相关问题的序号： \_\_\_\_\_

其他行为表现的例子或说明：  
请标明与你的例子或说明相关问题的序号： \_\_\_\_\_

其他行为表现的例子或说明：  
请标明与你的例子或说明相关问题的序号： \_\_\_\_\_

6

6



APPENDIX I

The Chinese Gilliam Autism Rating Scale–Second Edition (GARS-2)

# GARS-2

## 吉列姆自闭症评价量表第二版

### 概要/反应量表

#### 第一部分 基本信息

受测者姓名 \_\_\_\_\_ 男\_\_女\_\_ 年级 \_\_\_\_\_ 学校 \_\_\_\_\_  
评定日期 \_\_\_\_\_ 评分者姓名 \_\_\_\_\_  
受测者生日 \_\_\_\_\_ 测评者姓名 \_\_\_\_\_  
受测者年龄 \_\_\_\_\_ 测评者职称 \_\_\_\_\_

#### 第二部分 评分汇总

子量表	原始评分	标准评分	百分位数	均值标准误
刻板行为	_____	_____	_____	1
交流能力	_____	_____	_____	1
社会交往	_____	_____	_____	1
	总标准评分	_____		
	自闭症指数	_____	_____	4

1

1

### 第三部分

子量表标准评分	自闭症指数	自闭症可能性
≥ 7	≥ 85	可能性很高
4-6	70-84	可能
1-3	≤ 69	可能性很低

### 第四部分

标准分	子量表			自闭症指数
	刻板行为	交流能力	社会交往	
20	•	•	•	150
19	•	•	•	145
18	•	•	•	140
17	•	•	•	135
16	•	•	•	130
15	•	•	•	125
14	•	•	•	120
13	•	•	•	115
12	•	•	•	110
11	•	•	•	105
10	•	•	•	100
9	•	•	•	95
8	•	•	•	90
7	•	•	•	85
6	•	•	•	80
5	•	•	•	75
4	•	•	•	70
3	•	•	•	65
2	•	•	•	60
1	•	•	•	55

2

2



## 子量表 2: 交流能力

**评分概述:** 根据行为的发生率进行评分。

依照以下的准则评分:

- 0 从未观察到—你从来没有见过受测者有如此行为举止。
- 1 很少观察到—受测者每 6 小时有 1-2 次此行为举止。
- 2 有时观察到—受测者每 6 小时有 3-4 次此行为举止。
- 3 经常观察到—受测者每 6 小时有 5-6 次此行为举止。

标注您认为最能表述受测者在正常情况下一贯的行为的评分(例如:在大多数地方,和家人一起时,通常的日常活动中)。切记给每一项评分。如果你不确定如何去评分,请延迟评分,在对受测者进行 6 个小时的观察后再给予评分。**切记,每一项都要给一个评分。**

	从 未 观 察 到	很 少 观 察 到	有 时 观 察 到	经 常 观 察 到
受测人如何进行交流? 说话___ 用手势示意___ 不说话也不用手势___				
如果受测人不说话、打手势、或者其他形式的交流方式,此子量表略去				
15. 口头上或手势上反复重复某些别人说的字词	0	1	2	3
16. 脱离当前语境重复一些字词(即:重复之前听到的一些言语;例如:重复一些一分钟之前听到的字词)	0	1	2	3
17. 反复不停地重复一些字词或短语	0	1	2	3
18. 用平淡单调的语气,无情感,或不合节律的形式说话或示意	0	1	2	3
19. 对一些简单的指令不能做出适当的回应(例如:“坐下”,“起立”)	0	1	2	3
20. 当被呼唤到名字时,有意转移目光或回避与说话人对视	0	1	2	3
21. 不主动索要自己想要的东西	0	1	2	3
22. 不主动发起与同龄人或成人的谈话交流	0	1	2	3
23. 不能正确的使用“是”和“不是”。例如:当问他/她是否想要一些很令人厌恶的刺激时,回答“是”;或者当问他/她是否想要喜欢的玩具或食品时,回答“不”	0	1	2	3
24. 不能正确的使用代词(例如:指着自己是“他”或“你”)	0	1	2	3
25. 不能正确的用“我”(例如:不用“我”表示自己)	0	1	2	3
26. 反复重复如婴儿般的发声(例如:吧!吧!吧!达!达!)	0	1	2	3
27. 用手势代替说话或示意去索要某物	0	1	2	3
28. 不能就一些陈述性或简短故事的相关问题给予正确答案	0	1	2	3
子量表总分	—	+	+	+
交流能力总原始分				

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## 第六部分 家长访谈

此部分需由与受测者直接长期接触的家长或监护人来完成。父，母一方，或监护人都可以。通过标明**是**或**否**来回答问题。请完成每一项。

在以下方面是否有发育迟顿的表现：

### 社会交往：

- 是 否 在孩子三岁之前：
- 当家长试图抱孩子时，孩子是否伸手想要被抱起？
  - 当把孩子自己留在摇篮，护栏，或别的地方时孩子是否伤心哭闹？
  - 当孩子被抱起或搂抱时孩子是否伤心哭闹？
  - 当把孩子递给另一个人抱时孩子是否伤心哭闹？
  - 孩子是否喜欢参与家庭活动(例如：看电视)？

### 社交时的语言应用：

- 是 否 在孩子三岁之前：
- 孩子在 16 个月时是否会说单个的字词？
  - 孩子两岁时是否能用有意义的词汇交流？
  - 孩子从语言方面而言发育是否正常（即：呢啊声，唧呀声，语言无任何障碍或衰退）？
  - 孩子是否能遵照指示（即：要求做某事时能明白要去做什么）？
  - 孩子是否有正常的听力？

在以下方面是否有功能异常的表现：

### 社会交往：

- 是 否 在孩子三岁之前：
- 当父母或兄弟姐妹跟孩子笑或玩耍时孩子是否能冲他们笑？
  - 孩子一岁之前被陌生人接近时是否会哭？
  - 孩子三岁之前是否喜欢玩模仿游戏（例如：拍手游戏，躲猫猫）？
  - 孩子是否能关注并回应他人？
  - 孩子是否喜欢参与大家的聚会？

### 社交时的语言应用：

- 是 否 在孩子三岁之前：
- 当被喊到名字时孩子是否有反应（例如：扭头看着那个人）。
  - 当孩子想要某个东西时是否能用语言或肢体语言去表达交流？
  - 孩子是否能遵照简单的指示（例如：“过来”，“抱一下”，“摇摇手拜拜”）？
  - 当要求做某事时孩子是否能明白要去做什么？
  - 当父或母,或姊妹哭或伤心难过时,孩子是否能意识到（表现出担心的表情）？

6

7

### 模仿或有想象力的游戏

是 否 在孩子三岁之前：

- a. 孩子是否喜欢玩过家家游戏（例如：恰当的与玩具娃娃一起玩，扮演英雄，与小动物玩）？
- b. 是否扮演假装他人（例如：爸爸或妈妈，扮演英雄）？
- c. 是否能把某一样东西假当成另一样来玩？例如：把扫帚放在两腿之间假装自己骑着一匹马？
- d. 孩子是否在游戏中假装跟一个假想或虚构的朋友或小动物玩？
- e. 孩子是否把玩具娃娃假装成真正的人一起玩？

第六部分的目的是来记录受测者是否符合 DSM-IV-TR 的诊断标准。在此单元如果你对任一个问题回答 否，受测者即符合迟滞或功能异常的诊断。

7

8



## 第七部分 关键问题

以下问题是帮助测评者得到一个诊断结论而设计的。当测评者分析 GARS-2 的结果时应该参考这些问题。

1. 受测者的哪些行为使你考虑到他（她）患有自闭症？尽你所能描述一下这些特殊的行为。
2. 这些行为第一次出现在什么时候？他们应该出现在三岁之前。
3. 这些行为是否会在所有的场合？受测者的行为应该是有目共睹的，而不是只出现在某些特定场合或某些特定人群面前。
4. 这些行为是否由别的身心障碍所致？是否排除了其他的诊断？如何排除的？
5. 是否有其他测评者对受测者进行过评定，结果如何？受测者是否接受过有评定资格的人士的诊断？（例如：心理学专家，精神病医生，语言障碍治疗师，自闭症专家）
6. 除了 GARS-2 之外，受测者是否还接受过其他任何标准的评定？受测者是否接受过系统的测试？（智商测试，学习成绩评定，语言测试）
7. 受测者在自闭症三个方面的鉴定标准中是否都有明显的缺陷？（刻板行为，交流能力，社会交往）
8. 在自闭症诊断的三个方哪一部分最影响诊断？是什么症状？

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10

9. 这些症状的严重程度如何？是如何影响正常功能的？

10. 还有其他什么信息需要收集的？谁能够提供这些资料？

11. 还有其他什么方法能够用来进一步评定？

第八部分 分析阐述和建议

9

11

## 第九部分 GARS-2 的特征

**描述:** 吉列姆自闭症评价量表第二版是一个标准的评价工具。它是为测评自闭症患者和其他有严重行为障碍者所设计的。GARS-2 提供了规范参照信息以辅助自闭症的诊断。

**评分选择:** GARS-2 中的选择项是以 DSM-IV-TR (美国精神病学学会, 2000) 和美国自闭症协会 (2003) 对自闭症的定义为基础的。

**规范的数据:** 标准化的 GARS-2 基于美国 48 个州的 1107 名自闭症患者样本。

**可信度:** GARS-2 的内部一致性是用 Cronbach 的阿尔法方法来判定的。实验研究显示以下各项的阿尔法系数分别为: 表刻板行 0.84, 交流能力 0.86, 社会交往 0.88, 自闭症指数 0.94。这些可信度系数非常大, 表明这些子量表中的选项在与检测自闭症或其他严重行为障碍患者的行为特征能力是否一致。所有选项对于做出诊断决定的贡献都是可信的。

**有效性:** GARS-2 的有效性是通过多个研究证实的。每一个子量表的选项分析表明 GARS-2 的子量表选项是有相当的一致性和针对性的。同时进行的标准关联有效性的研究显示 GARS-2 的评分是可以用来辨别受测者是否属于不同的诊断组。其他的相关有效性证据是通过关联 GARS-2 评分和用自闭症行为检测表 (Autism Behavior Checklist, Krug, Arick, & Almond, 1993) 评分所获得的。正相关性是通过对这两个评分量表的相应子测评进行对比所得到的。有效性 预测分析显示 GARS-2 可以从大脑发育迟滞儿童, 多重障碍儿童, 正常儿童中鉴别出自闭症儿童。

10

12

## APPENDIX J

GARS-2 and CARS2-QPC rating scale comparison in English

between original and back-translation

### **GARS-2 and CARS2-QPC rating scale comparison in English between original and back-translation**

For each of the items below, please indicate whether the statements between original and back-translation have the same connotation in different scales. For example, if the meaning of these two is extremely different please mark "x" under "1" in the line of the item number on the left column. If the meaning of these two is extremely similar please mark "x" under "5" in the line of the item number on the left column. You will use the following scale as you rate each of the items below.

#### **GARS-2 (THE GILLIAM AUTISM RATING SCALE)**

scale items	1 (extremely different)	2 (somewhat different)	3 (uncertain)	4 (somewhat similar)	5 (extremely similar)
a <sub>1</sub>					
b <sub>1</sub>					
c <sub>1</sub>					
d <sub>1</sub>					
e <sub>1</sub>					
f <sub>1</sub>					
g <sub>1</sub>					
h <sub>1</sub>					
i <sub>1</sub>					
j <sub>1</sub>					
k <sub>1</sub>					
l <sub>1</sub>					
m <sub>1</sub>					
n <sub>1</sub>					
o <sub>1</sub>					
p <sub>1</sub>					
q <sub>1</sub>					
r <sub>1</sub>					
s <sub>1</sub>					
t <sub>1</sub>					
u <sub>1</sub>					
v <sub>1</sub>					
w <sub>1</sub>					
x <sub>1</sub>					
y <sub>1</sub>					

$z_1$					
$a_2$					
$b_2$					
$c_2$					
$d_2$					
$e_2$					
$f_2$					
$g_2$					
$h_2$					
$i_2$					
$j_2$					
$k_2$					
$l_2$					
$m_2$					
1					
2					
3					
4					
5					
6					
7					
8					
9					
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11					
12					
13					
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27					
28					
29					

30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
$n_2$					
$o_2$					
$p_2$					
Social Interaction	-----	-----	-----	-----	-----
$q_2$					
a					
b					
c					
d					
e					
$r_2$ Language Used					
a					
b					
c					
d					
e					
$s_2$					
Social Interaction	-----	-----	-----	-----	-----
a					
b					
c					
d					
e					
Language Used	-----	-----	-----	-----	-----
a					
b					
c					
d					

e					
t <sub>2</sub>					
a					
b					
c					
d					
e					
u <sub>2</sub>					
v <sub>2</sub>					
w <sub>2</sub>					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
x <sub>2</sub>					
y <sub>2</sub>					
z <sub>2</sub>					
a <sub>3</sub>					
b <sub>3</sub>					
c <sub>3</sub>					
d <sub>3</sub>					

**CARS2-QPC  
(SECOND EDITION QUESTIONNAIRE FOR PARENTS OR CAREGIVERS)**

scale items	1 (extremely different)	2 (somewhat different)	3 (uncertain)	4 (somewhat similar)	5 (Extremely similar)
a					
b					
c					
d					
e					
f					
g					
h					



Section 1	-----	-----	-----	-----	-----
i					
j					
k					
l					
m					
n					
1					
2					
3					
4					
5					
o					
6					
7					
8					
90					
10					
p					
Section 2	-----	-----	-----	-----	-----
q					
1					
2					
3					
4					
5					
6					
7					
8					
9					
Section 3	-----	-----	-----	-----	-----
r					
1					
2					
3					
4					
Section 4	-----	-----	-----	-----	-----
s					
1					
2					
3					
4					
Section 5	-----	-----	-----	-----	-----
t					
1					

2					
3					
4					
5					
Section 6	-----	-----	-----	-----	-----
u					
1					
2					
3					
4					
Section 7	-----	-----	-----	-----	-----
v					
1					
2					
w					
x					

## APPENDIX K

Revised GARS-2 and CARS2-QPC rating scale items comparison  
in English between original and back-translation

## Revised GARS-2 and CARS2-QPC rating scale items comparison in

### English between original and back-translation

For each of the items below, please indicate whether the statements between original and back-translation have the same connotation in different scales. For example, if the meaning of these two is extremely different please mark "x" under "1" in the line of the item number on the left column. If the meaning of these two is extremely similar please mark "x" under "5" in the line of the item number on the left column. You will use the following scale as you rate each of the items below.

Items	Original	Back-translation
CSI9	Carries on a conversation with another person that flows back and forth, at a level you would expect for someone of his or her age.	Keeps conversation going back and forth with others, at an age-appropriate level
CSII5	Initiates social interactions with adults and peers (not just to get a basic need met).	Volunteer to initiate social interactions with adults or peers (not base on basic needs)
CSIV4	Engages in make-believe play, taking on a role (not based on scripts from movies or TV shows).	Likes to play some roles from an type of acting (not only mimic actor or actress from movie or TV show)
CSVII2	Are there other unusual behaviors you have noticed that you would like to tell us about? Please list the specific behavior, and give an example or two.	Did you notice any other abnormal behaviors? Please list them and give one or two examples.
Gd2	Unlikely	Low Probability
Gc16	Repeats words out of context (i.e., repeats words heard at an earlier time; e.g., repeats words heard more than 1 minute earlier).	Repeats words not relevant to the context of current situation (i.e. repeats words heard at an earlier time, e.g. repeats words heard from one minute ago)

Revised scale items	1 (extremely different)	2 (somewhat different)	3 (uncertain)	4 (somewhat similar)	5 (extremely similar)
CSI9					
CSII5					
CSIV4					
CSVII2					
Gd2					
Gc16					

## VITA

Nannan Li was born in Shangqiu , Henan on January 5, 1980. She graduated from Zhumadian High School in Zhumadian, Henan in 2000. The following fall she attended Xinxiang Medical University in Xinxiang, Henan and interned in the Henan Provincial Psychiatric Hospital in 2004-2005, one of the premier clinics in China. She received the degree of Doctor of Medicine in Psychology in September, 2005. After graduation she returned to her hometown and began a residency at Zhumadian Psychiatric Hospital from 2005 to 2007. She came to Lexington, Kentucky with her husband, who is currently a scientist II in the Department of Physiology at University of Kentucky in September, 2007. Currently she is completing her Master's degree at Eastern Kentucky University and expects to receive her Master's of Science in General Psychology in May 2012.