

The Pennsylvania State University

The Graduate School

College of Education

**ESTABLISHING THE RELATIVE IMPORTANCE OF APPLYING GRAY'S SENTENCE RATIO
AS A COMPONENT IN A 10-STEP SOCIAL STORIES INTERVENTION MODEL,
TEACHING SOCIAL SKILLS TO STUDENTS WITH ASD**

A Dissertation in

Special Education

by

Balázs Tarnai

© 2009 Balázs Tarnai

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

May 2009

The dissertation of Balázs Tarnai was reviewed and approved* by the following:

Pamela S. Wolfe
Associate Professor of Special Education
Dissertation Adviser
Chair of Committee

Frank R. Rusch
Professor of Special Education

David L. Lee
Associate Professor of Special Education

Kathryn D. R. Drager
Associate Professor of Communication Sciences and Disorders

Kathy L. Ruhl
Professor of Special Education
Department Head, ESPSE

*Signatures are on file in the Graduate School.

Abstract

Literature on Social Stories refers to the method as a “popular trend” in the instruction of students with Autism Spectrum Disorders (ASD) and describes potential benefits but also cautions that there is little empirical evidence for their effectiveness. Reviews of the literature report variable effects, along with inconsistencies in Social Story structure, research design, and variation across participants and behaviors. In a recent study (Tarnai, Wolfe, & Rusch, under review), a 10-step approach to constructing and evaluating Social Stories for students with ASD was developed to guide procedural fidelity of Social Stories implementations.

Researchers have called for further investigations to determine the components of Social Stories intervention packages that contribute to their efficacy. One claim of Gray, the originator of the method is that Social Stories describe rather than direct behavior, which differentiates them from a mere task analysis chain. To create a contextual-descriptive framework, Gray has introduced a ratio of sentence types to be used in a Social Story. The present study seeks to investigate if, as Gray maintained, her recommended sentence ratio is an essential component of Social Stories in an instructional situation (remote from actual skill practice) for which they were designed. For this purpose, a 10-Step Social Stories intervention model using Gray’s sentence ratio (i.e., a ‘contextual’ Social Story), and a similarly composed method omitting Gray’s sentence ratio (i.e., a ‘directive’ Social Story), was compared in teaching social skills to students with ASD. Dependent measures evaluated teaching efficiency by student outcome indicators such as percentage of criterion attained (pre-defined task analysis steps); and number of necessary trials to criterion. Contextual Social Stories consistently yielded fewer trials to criterion and maintained stable performance at criterion.

Results suggest the relative importance of applying Gray’s sentence ratio as a component in a Social Stories intervention package. This finding is consistent with implications from other special education research studies that suggest that descriptive social-contextual information be added to instruction, beyond purely teaching the performance of a target task.

Table of Contents

List of Tables	vii.
List of Figures	viii.
Acknowledgements	ix.
Chapter 1. Introduction	1.
1.a) Autism Spectrum Disorders and Social Skills	1.
1.b) Social Stories as an Instructional Strategy	1.
1.c) Issues Hindering an Experimental Component Analysis of Social Stories	2.
1.d) Importance of the Present Study	4.
1.e) Purpose of the Present Study	5.
1.f) Research Questions	6.
Chapter 2. Review of the Literature.....	7.
2.a) Autism Spectrum Disorders and Social Skills	7.
2.a-I) Diagnostic criteria of autism spectrum disorders	7.
2.a-II) Social skills deficits and training for individuals with ASD	8.
2.b) Social Stories as Instructional Strategy for Individuals with ASD	10.
2.b-I) Definition of Social Stories	10.
2.b-II) Theoretical basis of Social Stories	11.
2.b-III) Social Stories in social skills training for individuals with ASD	13.
2.c) Current Research on the Efficacy of Social Stories	14.
2.c-I) Empirical evidence related to Social Stories	14.
2.c-II) Components of Social Stories intervention packages	15.
2.c-III) Implementation and outcomes of Social Stories interventions	18.
2.d) Component Analysis of Social Stories	20.
2.d-I) Issues hindering a component analysis of Social Stories	20.
2.d-II) A model Social Stories intervention package to facilitate component analysis	21.
2.e) Purpose of the Present Study	22.
2.e-I) Gray's rationale for a prescribed sentence ratio	22.
2.e-II) Related research support for Gray's social-contextual framework	24.
2.e-III) Evaluation of Gray's sentence ratio	25.
2.e-IV) Research questions	27.
Chapter 3. Research Method	28.
3.a) Participants/Settings	28.
3.b) Identification and Training of Project Staff / Informed Consent	29.
3.c) Pre-Implementation Procedures	29.
3.c-I) Assessment of potential participants	29.

3.c-II) Identification of dependent measures	31.
3.c-III) Definition of independent measures	33.
3.c-IV) Social Story construction	33.
3.c-V) Materials	35.
3.d) Implementation Procedures	36.
3.d-I) Reading of Social Stories	36.
3.d-II) Organization of target behavior performance	37.
3.e) Data Collection and Analysis	37.
3.d-I) Research design	37.
3.d-II) Scoring and graphing performance	38.
3.f) Treatment Integrity and Reliability of Observations	40.
 Chapter 4. Research Findings.....	 42.
4.a) Implementation – Independent Measures	42.
4.a-I) Individual Social Story Readings	42.
4.a-II) Fading of Social Stories	43.
4.a-III) Table setting routines	43.
4.b) Dependent measures	43.
4.b-I) Criterion level	43.
4.b-II) Number of trials-to-criterion	43.
4.b-III) Generalization data	43.
4.c) Social Validity	45.
 Chapter 5. Discussion	 47.
5.a) Model for an Experimental Component Analysis	48.
5.b) The Text of a Social Story – Social Elaboration through Gray’s Sentence Ratio	48.
5.b-I) Extending the research base	48.
5.b-II) Classifying question sentences	52.
5.c) Instrumentation and Implementation of Social Stories	52.
5.c-I) Participants/Settings	52.
5.c-II) Target behavior	53.
5.c-III) Dependent measures	55.
5.c-IV) Independent measures – Procedures	56.
5.c-V) Research Design	57.
5.d) Limitations of the Study.....	58.
5.e) Future Research Directions.....	60.
5.f) Implications for Researchers and Practitioners	61.
5.g) Conclusions	63.

References	65.
Appendices.....	72.
A) Sample Communication Matrix Profile Sheet	72.
B) DIBELS Benchmark Goals and Indicators of Risk: Second Grade	73.
C) Task Analysis for Place Setting	74.
D) Place Setting Directive Social Story	75.
E) Place Setting Contextual Social Story	76.
F) Social Story Books Hung up on the Agency Program Room’s Wall	78.
G) Social Story Construction & Implementation Evaluation for Treatment Integrity	79.
H) Tables	80.
I) Figures	94.

List of Tables

Tables.....	80.
Table 1. <i>Diagnostic Criteria for Autistic Disorder</i>	81.
Table 2. <i>Basic Sentence Types Used in Social Stories</i>	82.
Table 3. <i>Overview of Participants, Target Behaviors, Settings, Duration and Research Design of Social Story Implementation Studies</i>	83.
Table 4. <i>Overview of Story Construction, Implementation Strategies, and Effectiveness (PND) of Social Story Implementation Studies</i>	85.
Table 5. <i>Empirically Supported Effective Instructional Components of Social Stories</i>	88.
Table 6. <i>Tarnai's 10-Step Approach to Constructing and Evaluating Social Stories</i>	90.
Table 7. <i>Overview of Participants' Demographics, and Assessment Scores Prior to Social Story Implementations</i>	92.
Table 8. <i>Social Validity Rating of Social Story Implementations by the Human Service Agency Program Staff</i>	93.

List of Figures

Figures94.

Figure 1. *Matched-Pairs Multiple Baseline Design Used for the Current Study* -----95.

Figure 2. *Performance Graphs of Social Story Interventions* -----96.

Figure 3. *Placement of Napkin and Questions Asked*
About its Positioning (Not Included in Social Stories)-----98.

Acknowledgements

I have come a long way; geographically, mentally, culturally... and against many odds. The mere fact that I have been able to arrive at the point in my life where I am, finishing the manuscript of my doctoral dissertation in Pennsylvania, is nothing short of a miracle.

Many have accompanied me on this road; many have educated me: real and 'adopted' family, true friends, teachers, professors, therapists – and yes, the students, the patients. I owe and would like to express my deepest gratitude to all of them. But there is one couple I need to single out: my paternal grandparents, Sir Ottó and Zsóka.

One could say that I grew up in the bloodline and tradition of a dynasty of (special) educators. Being the first one in this line to be awarded a doctorate does not mean that others who have walked this path before me would not have deserved the title, even more so than myself. My great-grandparents educated both the children and the farmers of a small community in the middle of a stormy time in history where science, respect, faith and character were subordinate to war-heated nationalist ideologies. My grandparents played a major role in the seemingly hopeless quest of resurrecting special education services in a post-world war country that had just lost two thirds of its territory and was of no interest to the "big powers" that governed world politics. Yet, out of horse barns without windows, a door or a roof, and with dedicated professionals without a salary – a service system was built that has kept up with modern knowledge and philosophies of the field; even during the communist oppression over Eastern Europe, when my parents started their young careers. The spirit of those times did not grant the circumstances for the pursuit of a higher academic degree.

Nonetheless, my grandparents brought me up in the spirit of service; and against all odds, have acquainted me with God, an ancient and proud cultural tradition, devotion and determination, love for the field, and even 'Western' professional literature and the languages necessary to access them. It is thanks to them that I have arrived here. My accomplishments are their extended accomplishments; my recognition is their well-deserved recognition.

In the spirit that I grew up with, and with which I was introduced to the service of this field, I would like to humbly put my talents to serve all and any one in need, as a Christian knight and as a professional, wherever in the world I shall be led. Thus said, I would also like to recognize that adding to my rich, wide-ranging life experience, uniquely within my person:

“I am Hungarian.

My soul and my sentiment

Have been given a heritage

Which I shall not throw away.”

/Babits, M./

Sir Balázs Tarnai

Greensburg, Pennsylvania

Labor Day, 2008.

Chapter 1. Introduction

a. Autism Spectrum Disorders and Social Skills

Social skills deficits represent an essential part of the diagnostic picture of autism spectrum disorders (ASD) or pervasive developmental disorders (PDD). Several specific characteristics of social interaction and of communication are outlined in the DSM-IV-TR (Diagnostic and statistical manual of mental disorders by the American Psychiatric Association, 1994; text revision 1996) for the diagnostic label of a PDD and specifically, of autism (see Table 1). The DSM-IV-TR defines autism as impairment in reciprocal social interaction with a severely limited behavior, interest, and activity repertoire. Individuals who have autism frequently show impairments of social interaction in areas such as the ability to initiate social relationships or to maintain close reciprocal relationships (Smith & Philippen, 2005). Further, these individuals may have difficulties taking the perspective of others and understanding viewpoints other than their own (Baron-Cohen, 2005). The majority of individuals with autism have either a limited interest in reciprocal social interactions, or they may have an interest in interacting with others but lack the necessary skills to do so effectively (Szatmari, Bartolucci, Bremner, Bond, & Rich, 1989).

Formal social skills training often is part of curricula for students with ASD because of their typical impairments in social interactions. Social skills are among the most complex, but also the most important, behaviors to learn because they have a great impact on an individual's social engagement and quality of life; thus, social skills training constitutes an important aspect of working with individuals with ASD/PDD (Neisworth & Wolfe, 2005; Chadsey-Rusch, 1992). One particular instructional tool for teaching social skills to students with autism is an intervention called Social Stories.

b. Social Stories as an Instructional Strategy

A Social Story is a short story, defined by specific characteristics, that describes a situation, concept, or social skill using a format that is meaningful for individuals with ASD (Reynhout & Carter, 2006). Originally, Social Stories were developed by Gray (1995) to teach

children with autism how to play recreational games while increasing their ability to interact socially with others (Quill, 1995). They have been used with a focus on diverse social skills in the instruction of children with varying degrees of severity of ASD (Barry & Burlew, 2004; Reynhout & Carter, 2006). Gray and White (2002) have published a book with many sample Social Stories for practitioners that covers various topics including self-care, playing at home and going places; however, these samples do not include empirical information on implementation of such Social Stories. Reviewers of Social Story literature (Barry & Burlew, 2004; Reynhout & Carter, 2006; Sanosti, Powell-Smith, & Kincaid, 2004; Tarnai et al., under review) identified approximately 30 published studies in which Social Stories have been implemented and have reported that behavioral targets included both aims to decrease socially disruptive or challenging behaviors (e.g., using loud voice, dropping to floor for tantrum, spilling food/drink) and to increase social interaction or communicative behaviors (e.g., napkin use, sharing toys, greeting). Generally, such targeted behaviors were broadly interpreted as social skills, not limited in nature, but had in common that they had to either be displayed more often, or they had to be avoided, within a given social context in order for the participants' conduct to be regarded as (socially) appropriate.

Gray (1995) emphasized that Social Stories are intended to describe more than direct behavior, thus, Social Stories are differentiated from instructional techniques such as task analysis chains. To ensure a descriptive framework, Gray introduced a ratio of specific sentence types (Table 2) to be used in a Social Story (i.e., two to five descriptive, perspective, and/or affirmative sentences for every directive and/or control sentence). Reviews of the literature (Barry & Burlew, 2004; Reynhout & Carter, 2006; Sanosti et al., 2004; Tarnai et al., under review) have revealed that Social Story implementations do not systematically adhere to Gray's sentence ratio.

c. Issues Hindering an Experimental Component Analysis of Social Stories

Reynhout and Carter's review of the literature (2006) points out that Gray's (1995; 2003) recommendations for story construction were not based on empirical evidence. In their review,

the authors identified some studies that yielded higher percentages of non-overlapping data (PND) for “inappropriately modified” stories (p. 462) that violated Gray’s ratio (i.e., by using fewer descriptive and more directive sentences, or using a higher proportion of consequence sentences than suggested by Gray). However, Reynhout and Carter (2006) conclude that because of a high degree of procedural variation among their reviewed studies, and additional issues of treatment fidelity, no sufficient experimental control was established to ascertain solid empirically based findings related to the efficacy of Social Stories.

Although studies reviewed by Tarnai et al. (under review) have reported some positive outcomes (e.g., Bledose, Myles, & Simpson, 2003; Brownell, 2002; Hagiwara & Myles, 1999; Kuoch & Mirenda, 2003; Kuttler, Myles, & Carlson, 1998; Lorimer, Simpson, Myles, & Ganz, 2002; Scattone, Wilczynski, Edwards, & Rabian, 2002; Scattone, Tingstrom, & Wilczynski 2006; Swaggart, Gagnon, Bock, Earles, Quinn, Myles, & Simpson, 1995), such positive outcomes were not linked to certain procedural variations. As Tarnai et al. (under review) note, because component variables were not systematically manipulated across replicated interventions, effective components were not isolated, hence, not distinguishable.

Hence, the central issue identified by reviewers of Social Story interventions (Barry & Burlew, 2004; Reynhout & Carter, 2006) is the lack of a consistent research base that would make Social Story interventions comparable along the components of intervention packages. At present, because so many Social Story components are varied at the same time, a comparative component analysis is not possible and thus, the relative necessity of individual intervention components (e.g., Gray’s sentence ratio for story construction) cannot be established. However, a component analysis would be desirable to establish an empirical basis for Social Stories and to guide practitioners in implementing Social Stories in the most efficient manner.

In order to make a component analysis possible, a ‘common ground’ should be established so that components of Social Stories can be systematically manipulated while leaving other factors uniform. Only through a component analysis can Gray’s (1995; 2003)

hypothesis (for ensuring a social-context in Social Stories) be tested. Specifically, a component analysis is needed in the field to establish whether adherence to the sentence ratio outlined by Gray is necessary when implementing a Social Stories intervention package.

d. Importance of the Present Study

Gray's (1995; 2003) recommendations for Social Story construction are not based on empirical evidence but rather on anecdotal experience as a teacher and practitioner working with students with ASD (Reynhout & Carter, 2006). Nonetheless, literature (Barry & Burlew, 2004) underlines that Social Stories typically incorporate instructional tools that are empirically established in special education research, and specifically, in interventions for autism.

Without a component analysis, it is not possible to ascertain whether Gray's (1995; 2003) specific recommendations for constructing Social Stories (i.e., her sentence ratio) are necessary or whether other instructional components can achieve the same effect (with a possibly less complicated intervention, since applying Gray's sentence ratio for constructing a text requires careful adherence to specific guidelines). An answer to this question is needed because for over a decade, Social Stories have been, and continue to be, applied (Barry & Burlew, 2004; Reynhout & Carter, 2006) without a common framework and without empirical evidence of their relative efficacy in practical implementation.

In response to the lack of a component analysis, Tarnai et al., (under review) reviewed and analyzed Social Stories interventions for individuals with ASD to identify central elements of implemented intervention packages, in order to establish an empirical basis for comparison, so that systematic experimental manipulations could be introduced. Tarnai et al.'s (under review) review identified Social Story intervention components typically reported in the literature. Based on the review, a 10-step model Social Stories intervention package was developed and implemented in a pilot study to test whether the isolated components constituted an effective Social Story intervention. Procedural fidelity was established, and the Social Story implementations resulted in attainment of behavioral goals by six individuals with ASD. These

goals included reducing inappropriate social behaviors such as hitting for attention, stigmatizing vocalizations, indecent scratching or self-exposure in public; and increasing social interaction and initiation within an applied social skills training setting.

e. Purpose of the Present Study

The present study builds on the framework of the 10-step approach from Tarnai et al.'s (under review) study that lends a basis of comparison for systematic modifications within a Social Stories intervention package. Specifically, the study sought to examine if Gray's sentence ratio was an essential component of Social Stories interventions to attain positive outcomes on social skills for individuals with ASD.

For this purpose, a 10-Step Social Stories intervention model including Gray's sentence ratio (i.e., a 'contextual' Social Story), and a similarly composed model omitting Gray's sentence ratio (i.e., a 'directive' Social Story), was compared in teaching social skills to students with ASD. The only formal instruction given consisted of reading one of the Social Stories versions (i.e., contextual or directive) individually with each participant, prior to the activities of daily social skills training sessions that the participants have routinely participated in.

Dependent measures included student outcome indicators such as percentage of criterion attained (based on pre-defined task analysis steps – i.e., all steps of TA performed correctly = 100%); and number of trials to criterion. These dependent measures represented practical measures of effectiveness and efficiency. Efficiency is an important element to be considered. As previous research has shown, both Social Stories, and other 'good practice' components of social skills intervention packages may produce positive outcomes. Thus, teaching efficiency could have pragmatic significance related to whether or not the labor of carefully constructing a personalized Social Story adhering to Gray's guidelines (specifically, adherence to her sentence ratio) is necessary and justifiable.

f. Research Questions

Leaving other intervention components constant, the present study sought to establish the relative importance of applying Gray's sentence ratio as a component in a Social Story intervention package. Research questions included: (a) Is there a difference between a contextual Social Story intervention package including Gray's sentence ratio, and a directive Social Story intervention omitting Gray's sentence ratio, for teaching table setting to students with ASD, on performance measured by percentage of criterion attained (based on pre-defined task analysis steps)?; and (b) Is there a difference between a contextual Social Story intervention package including Gray's sentence ratio, and a directive Social Story intervention omitting Gray's sentence ratio, teaching table setting skills to students with ASD, on performance measured by number of necessary trials to criterion?

In addition to these primary dependent measures, an ancillary measure to assess response generalization was also included. Specifically, (c) the placement of an additional utensil (i.e., napkin) not included in the Social Stories for table setting will be recorded during baseline and intervention; to explore the possibility of generalization-across-behaviors of the social-contextual message of the contextual Social Story version (i.e., adhering to Gray's sentence ratio) that emphasizes the advantages of the predictability of a certain place setting.

Chapter 2. Review of the Literature

a. Autism Spectrum Disorders and Social Skills

I. Diagnostic criteria of autism spectrum disorders. Autism spectrum disorders (ASD) are defined in IDEIA (Sec. 300.7; Public Law 108-446, 2004) as a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, that adversely affects a child's educational performance. Other characteristics often associated with ASD are engagement in repetitive activities and stereotypic movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. IDEIA (2004) also emphasizes that the term ASD does not apply if a child's educational performance is adversely affected primarily because the child has an emotional disturbance.

The DSM-IV-TR (Diagnostic and statistical manual of mental disorders by the American Psychiatric Association, 1994; text revision 1996) identifies a group of disorders labeled as Pervasive Developmental Disorders (PDD) including infantile autism, autism, Asperger's syndrome, Rett syndrome, childhood disintegrative disorders (CDD), and pervasive developmental disorders not otherwise specified (PDD-NOS). The term Autism spectrum disorders (ASD) is often used in the field of special education to refer to the same spectrum of impairments of varying degrees, labeled with the umbrella term of PDD in the DSM-IV-TR's diagnostic system; which typically impedes reciprocal social interaction with a limited behavior, interest, and activity repertoire.

Specifically, according to DSM-IV-TR diagnostic criteria, a total of six (or more) of the following characteristics apply to receive a diagnosis of autism (see detailed in Table 1): (a) marked impairment in use of nonverbal behaviors to regulate social interaction; (b) failure to develop peer relationships appropriate to developmental level; (c) lack of social or emotional reciprocity; (d) delay or total lack of the development of spoken language, without attempt to communicate by other modalities (e.g., gestures); (e) marked impairment in the ability to initiate

or sustain conversation; (f) stereotyped and repetitive use of language; (g) lack of spontaneous make-believe or social imitative play; (h) preoccupation with patterns of interest, abnormal in intensity or focus; (i) inflexible adherence to routines or rituals; (j) stereotyped and repetitive motor mannerisms; and (k) persistent preoccupation with parts of objects (APA, 1996).

II. Social skills deficits and training for individuals with ASD. Social skills deficits represent an essential part of the diagnostic picture of ASD. The majority of individuals with ASD either have a limited interest in reciprocal social interactions; or although they have an interest in interacting with others, they may lack the necessary skills to do so effectively (Szatmari et al., 1989). Individuals with ASD often display impairments in social competence in areas such as eye contact, joint attention, body language and distance in space to a communication partner, and social and/or imaginary play. However, because effective interaction skills need to be goal-oriented and their use in accomplishing those goals should be socially acceptable, interaction skills should elicit positive or neutral responses from communication partners rather than negative reactions or misunderstanding/confusion (Chadsey-Rusch, 1992). Without structure or support in the above areas, individuals with ASD tend to remain socially isolated and make fewer overt initializations to peers than typically developing persons (Neisworth & Wolfe, 2005).

Because social skill deficits hinder effective interaction, they may be viewed as a form of communication disorder, that is, a disruption in the process of exchanging information and conveying ideas (Bernstein & Tiegerman-Farber, 2002). Such communication disorders for individuals with ASD primarily involve the pragmatic use of language, rather than phonological and/or grammatical aspects of how language is formed. Impaired functioning in areas such as turn taking, reading facial and postural cues, knowing how to lead (initiate, maintain, terminate) a discussion, knowing how to apply social courtesies, and how to keep appropriate distances may seriously limit an individual's conversational engagement potential (Neisworth & Wolfe, 2005). Poor social cognition, defined as an information exchange process that is disturbed by inappropriate or irrelevant understanding, interpretation and judgment, is also evidenced by

individuals with ASD (Travis & Sigman, 1998). Limited conversational skills do not empower an individual for correcting communication breakdowns or filling in lacking information that may result from misunderstanding a communication partner's behavior.

Other terms applied to poor social cognition include mind-blindness, or processing difficulties in mind reading or theory of mind (ToM). ToM refers to taking another person's conceptual perspective and attributing beliefs, desires, intentions, and emotions (Baron-Cohen, 1995). Mind-blindness, or deficits of ToM, may result in students with ASD having difficulties deciding when, where, with whom, and with what intensity a behavior should be displayed. Further, mind-blindness makes it difficult for individuals with ASD to recognize relevant cues in the 'hidden curriculum' of the social environment (Myles, 2005). The hidden curriculum is a set of rules that everyone in the school or community/society knows, but that no one has been directly taught; examples of hidden curriculum may include how to dress, how to act, what to do and what not to do and when, with whom to talk, whom to ignore, knowing teacher or peer expectations, and behaviors that attract positive or negative attention (Myles, 2005).

Social skills are among the most complex, but also the most important, behaviors to learn because they have a great effect on an individual's social engagement and quality of life. Thus, social skills training constitutes an important aspect of working with individuals with ASD (Myles, 2005; Neisworth & Wolfe, 2005; Scott, Clark, & Brady, 2000; Chadsey-Rusch, 1992). Haring and Breen (1992) have grouped social skills training approaches for individuals with disabilities into three categories: (a) contextual training that focuses on making changes in the environment such as physical setting, materials, and activity arrangements, in order to promote social interaction; (b) individual social training that aims to enhance targeted social skills through explicit instruction; and (c) peer training that teaches supportive behavioral strategies to others in the social environment of the person with disabilities, such as classmates, friends and family members, or members of the larger community who share common activities with the supported individual. Formal social skills training often is part of curricula for students with ASD because of

their significant impairments in social interactions (Myles, 2005; Scott et al., 2000; Chadsey-Rusch, 1992). One particular instructional strategy for teaching social skills to students with autism is an intervention called Social Stories.

b. Social Stories as Instructional Strategy for Individuals with ASD

1. Definition of Social Stories. A Social Story is a short story defined by specific characteristics that describes a situation, concept, or social skill using a format that is meaningful for people with ASD (Reynhout & Carter, 2006). Social Stories were developed by Gray (1995) to teach children with autism how to play games while increasing their ability to interact socially with others (Quill, 1995). Typically, Social Stories are constructed with six basic sentence types (Table 2) that Gray (1995) has introduced and defined. Practitioner-oriented literature on Social Story construction (e.g., Scott et al., 2000; Gray, 2003) also describes and suggests the use of additional research-based instructional strategies to make Social Stories more effective for students with ASD. According to authors (Quill, 1995; Scott et al., 2000; Gray, 2003), the perspective of the child for whom the story is written should always be adopted and maintained; adherently, stories should be written in the first (or sometimes in the third) person singular (e.g., 'I will use my inside voice', or 'Peter will clear the table after the meal'). Further, behavioral responses should be stated in positive terms (e.g., 'I am going to use my low voice' vs. 'I am not going to yell out'). Words and/or images may be used to supply the student with a permanent product to which he or she can refer back when practicing the target skill (e.g., a small note card with a politely formulated sample question the student is expected to ask). The student's comprehension of the story should be checked before proceeding to skill practice with the story. Comprehension checks would typically be done either in a written or spoken questions-and-answers format, with a comprehension checklist, or by letting the student fill in a version of the story that has blanks (e.g., 'when I need to use the bathroom, I will walk up to ____ and ask permission, saying ____'). Gray (2003) suggested that a Social Story first be read in close proximity to a situation where the student is likely to need to use the target skill, and then later

practiced in relevant real-life contexts and situations. Depending on progress made, the reading of the Social Story may become less frequent, and parts of the story faded out, thus leaving the student with an increasingly simpler procedural facilitator until the target behavior becomes a routine part of the student's repertoire (e.g., a small note card with a few bulleted key steps remain for the student to refer to as a summary of a previously read full narrative story).

II. Theoretical basis of Social Stories. Gray's (1995; 2003) recommendations for Social Story construction are not based on empirical evidence but rather on her experience as a teacher and practitioner working with students with ASD (Reynhout & Carter, 2006). Nonetheless, literature underlines that Social Stories typically incorporate instructional tools that are empirically established in special education research, and specifically, in interventions for ASD (Barry & Burlew, 2004). Thus, even though Gray (1995; 2003) did not outline a thorough theoretical foundation, researchers (Barry & Burlew, 2004; Reynhout & Carter, 2006) have attempted to retrospectively build a theoretical basis explaining the purported success of Social Stories interventions.

One theoretical basis for social stories centers on the theory of mind (ToM). Garfield, Peterson, and Perry (2001) define ToM as "whatever knowledge guides propositional attitude attribution and the explanation and prediction of behaviour by means of inner states and processes (pp. 495)." According to this theoretical basis, individuals with ASD, supposedly lacking ToM, are consequently unable to appreciate other people's intentions, beliefs, needs and desires (Greenway, 2000). Research has examined and has shown empirical support in both linguistic (Happe, 1995) and social skills training areas (Ozonoff & Miller, 1995) for the development of ToM. In these studies, individuals with ASD who had significant impairments in both linguistic and social skills domains have consequently shown ToM-specific deficits as well. Perspective sentences (Table 2) in Social Stories are seen to address this social-cognitive deficit (Garfield et al., 2001).

Another theoretical frame of reference for Social Stories involves the concept of shared schemata or background knowledge. Rowe (1999) suggests that a Social Story constructs a scaffold of understanding for a schema (i.e., mental representation) that an individual with ASD does not yet possess. Myles and Simpson (2001) describe Social Stories as providing access to a social skill's hidden curriculum. As noted previously, the hidden curriculum refers to the dos and don'ts innately (i.e., without having been explicitly taught) understood and adhered to by everyone (Myles, 2005).

Many components of Social Stories interventions such as story construction and skill practice routines that are suggested for use in Social Stories interventions (Gray, 1995, 2003; Scott et al., 2000; Barry & Burlew, 2004) parallel techniques from the literature on explicit teaching (Table 5). Empirically based instructional strategies that are used in social stories include a visual, permanent product, written in simple language, based on careful assessment of the student, focused on key areas (e.g., social interaction), and focusing on the perceptions of others (Smith, 2001; Barry & Burlew, 2004). In a survey of school staff, parents, and caretakers trained in the Social Story approach, the majority reported it to be practical and effective (Smith, 2001).

The use of empirically based instructional strategies such as task analysis, presentation and practice of small explicit steps, visual aids and graphic organizers, modeling, review and guided practice, corrective feedback, independently accessible reminders or procedural facilitators, or opportunities to practice in both training and general environments for skill maintenance and generalization often are part of Social Stories intervention packages (Barry & Burlew, 2004; Reynhout & Carter, 2006). These strategies are not only recommended by advocates of Social Stories interventions (Quill, 1995; Scott et al., 2000; Barry & Burlew, 2004; Reynhout & Carter, 2006), but also shown to be effective by researchers of instructional and/or applied behavior analytical techniques (Brophy, 1986; Brophy & Good, 1986; Ellis, Worthington,

& Larkin, 1994; Rosenshine, 1997; Swanson & Hoskyn, 1998; Elbaum, Vaughn, Hughes, & Moody, 1999; Vaughn, Gersten, & Chard, 2000; Ellis, 2001).

This methodological overlap has not been overlooked by researchers evaluating Social Stories interventions (Yarnall, 2000; Elder, 2002; Reynhout & Carter, 2006; Tarnai & Wolfe, 2008). However, because of the frequent use of additional strategies when implementing Social Stories (e.g., reinforcement schedules, prompting, modeling, shaping) supplementing the text of the Social Story itself, it has been questioned whether Social Stories are at all a necessary addition to other, evidence based instructional practices, as an independent variable causing change in social behaviors (Reynhout & Carter, 2006). Current research does offer some empirical basis for the evaluation of Social Stories interventions, but open questions still remain.

III. Social Stories in social skills training for individuals with ASD. Social Stories have been used for over a decade, since they were introduced in 1995, to teach children with varying degrees of severity of autism or Asperger's syndrome the cues and behaviors they needed to know to interact with others in a socially appropriate manner (Barry & Burlew, 2004; Reynhout & Carter, 2006). Gray and White (2002) have published a book with sample Social Stories for practitioners to use, covering various topics including self-care (e.g., finding a toilet, washing hands, accepting medicine from a care taker, how do adults help one take a bath, etc); playing at home (e.g., what to say to friends who come over to visit, how to share video games, what does it mean that someone's parents are divorced, etc.); going places (e.g., why does one need to wait in check out lines, how does one behave in the school bus, what does it mean to eat out and who decides where to eat then, what one can do while waiting for the food ordered, when to use a spoon or a fork, etc.). However, the sample suggestions given by Gray and White (2002) do not include reports on actual implementation of such Social Stories.

Researchers who have reviewed the literature related to Social Stories (Barry & Burlew, 2004; Reynhout & Carter, 2006; Sanosti et al., 2004) have identified approximately 30 published implementation studies. Tarnai et al. (under review) have recently reviewed 21 individual

scenarios (Tables 3; 4) in nine published Social Stories implementation studies (Bledose et al., 2003; Brownell, 2002; Hagiwara & Myles, 1999; Kuoch & Miranda, 2003; Kuttler et al., 1998; Lorimer et al., 2002; Scattone et al., 2002, 2006; Swaggart et al., 1995). These reviewed studies reported a variety of targeted inappropriate social-interaction behaviors (e.g., using loud voice, dropping to floor for tantrum, spilling food/drink), as well as appropriate social-interaction behaviors (e.g., napkin use, sharing toys, greeting) (Table 3). Targeted behaviors were not limited in nature by any definition as of what constituted a social skill. Rather, the reviews indicated that common to the studies were target behaviors that needed to be either avoided or displayed (inappropriate vs. appropriate behaviors, respectively) within a given social context. Further goals of targeted behaviors in Social Stories interventions were to increase the participants' social acceptance and functioning and thus, to enhance the quantity, as well as the quality of social interactions for individuals. Hence, any target skill may be considered for teaching through a Social Story that is expected to be performed within a social context and the performance of which is likely to increase social functioning and acceptance of the student.

c. Current Research on the Efficacy of Social Stories

1. Empirical evidence related to Social Stories. Reviews of the literature (Barry & Burlew, 2004; Reynhout & Carter, 2006; Sanosti et al., 2004; Tarnai et al., under review) have summarized approximately 30 published implementation studies. These reviews indicated similarities across studies that were included. Thus, there is some agreement among researchers in the field as of what constitutes a typical Social Stories intervention. As noted previously, these reviews (Barry & Burlew, 2004; Reynhout & Carter, 2006; Sanosti et al., 2004; Tarnai et al., under review) identified a variety of target behaviors in the literature, including both socially disruptive or otherwise challenging behaviors to be decreased, and social interaction, communicative or on-task behaviors to be increased (Tables 3; 4).

One goal of researchers of Social Stories interventions (Barry & Burlew, 2004; Reynhout & Carter, 2006) was to evaluate the interventions' efficacy in attaining change in social target

behaviors. Reviewed studies identified some positive outcomes in terms of change in target behaviors (see PND, Table 4); however, lack of consistency in Social Stories implementation procedures made comparisons difficult. Typically, many different components were varied across studies, making it impossible to compare outcomes as relating to the components of individual intervention packages (Barry & Burlew, 2004; Reynhout & Carter, 2006; Tarnai et al., under review). In order to judge efficacy, Social Stories implementations need to be made comparable along clearly defined component characteristics.

To clarify the extent of variety within Social Story implementations, Tarnai et al. (under review) undertook a systematic review of 21 Social Stories implementations examining variables such as (a) demographics (participants); (b) dependent variables (target behaviors); (c) independent variables (setting, study duration, research design, method of story presentation, comprehension checks, additional strategies used [reinforcers, prompts or other], sentence type ratio); and (d) measures of treatment effectiveness such as PND (percentage of non-overlapping data points) between baseline and treatment phases. Their analysis revealed some commonalities in implementation procedures of social stories across studies. Further, they found that variations in Social Story interventions primarily were present in story construction (sentence type ratios) and/or research designs. In spite of these differences, only a few basic implementation variations were repeated across studies (Tables 3; 4). However, these variations, even if few in number did not lend themselves to clear interpretation regarding treatment efficacy for certain intervention components because individual variables were not systematically manipulated across replicated interventions. The studies usually differed along more than just one single implementation variable and had no common set of characteristics systematically held constant (Tarnai et al., under review).

II. Components of Social Stories intervention packages. Tarnai et al. (under review) undertook the task to identify a common core of components in various Social Stories implementation studies (Bledose et al., 2003; Brownell, 2002; Hagiwara & Myles, 1999; Kuoch &

Mirenda, 2003; Kuttler et al., 1998; Lorimer et al., 2002; Scattone et al., 2002, 2006; Swaggart et al., 1995) in order to define a basic or core Social Story intervention that could be regarded as agreed-upon in the field (see Tables 3; 4). Tarnai et al. (under review) found there was overall consistency in demographic variables. Participants (N = 1–4 per study) were mostly boys (only one girl among 21 cases) diagnosed with ASD, between 3–13 years of age, with sufficient language/literacy skills that enabled them to read their personalized Social Stories.

The readability level of a Social Story is not pre-defined, but rather adjusted to the needs and abilities of individual participants (Gray, 1995; 2003; Scott et al., 2000). Gray (1995; 2003) suggested that a comprehension check be conducted after the initial reading of a Social Story, and prior to proceeding to skill practice, in order to judge if the story had potential to be meaningful to the student. Reviewed Social Stories implementation studies revealed a frequent omission of comprehension checks before skill practice with the story. Only one group of researchers (Scattone et al., 2002; 2006) consistently assessed their participants' understanding of Social Stories with a set of pre-formulated questions to ascertain that a mismatch between Social Stories and individual participants' abilities would not misleadingly indicate (in)efficacy of intervention.

In addition, Tarnai et al. (under review) found that most reviewed Social Stories implementations used no additional instructional strategies (e.g., added contrived reinforcers or prompts) complementing the reading of the Social Story itself; but rather used naturally available reinforcers in routine social-interaction situations where the interventions occurred. In 6 of the 9 studies, some visual aids other than printed words (e.g., photos or images) were used within the Social Story, to which students could refer back when practicing a target skill. Gray first discouraged (1995), then allowed but did not require (2003), the use of graphical visual aids for supporting the text of a Social Story. All but one of the reviewed Social Story implementations used hard copies of texts to be read; Hagiwara and Myles (1999) used a computer-based format (Table 4).

Further, Tarnai et al. (under review) found that reviewed Social Stories interventions reported a variety of targeted inappropriate (e.g., using loud voice, dropping to floor for tantrum, spilling food/drink) and appropriate (e.g., napkin use, sharing toys, greeting) social-interaction behaviors (Table 3). They found considerable variability across Social Stories implementations regarding the construction of the text of the Social Stories themselves. According to Gray's (1995; 2003) original recommendations, Social Stories are to be constructed with six basic sentence types (Table 2). Four of the sentence types center on social situations, feelings and/or responses of the student or others in that situation, a commonly shared value or opinion, or what others will do to assist the student: (a) descriptive (e.g., My classmates and I eat lunch together in the school cafeteria.), (b) perspective (e.g., The noise in the school cafeteria may be loud and may scare me.), (c) affirmative (e.g., It is polite to wait for my turn when I line up with my classmates to get food and drinks.), and (d) cooperative sentences (e.g., The server behind the counter will hand me my choice of drink.). Two sentence types center on either a concrete behavioral response or a strategy to be recalled and used by the student: (e) directive (e.g., I will say out loud my choice of drink to the server behind the counter.) and (f) control sentences (e.g., I will remember that I may only choose one drink to go with my meal, but I can always try something else the next time.).

Although each reviewed study referenced Gray's guidelines (1995; 2003) for story construction, her recommended sentence ratio (i.e., two to five descriptive, perspective and/or affirmative sentences for every directive and/or control sentence in a Social Story) was not adhered to in all instances. Specifically, 15 of the 21 scenarios in Tarnai et al.'s review (under review) adhered to Gray's ratio (see Table 4). Those scenarios that did not adhere, typically violated the ratio by adding more directive sentences to the formula than recommended. As an extreme example, Hagiwara and Myles (1999) exclusively used some perspective sentences (11% of total sentences used) in addition to the overwhelming majority of directive sentences (89%).

III. Implementation and outcomes of Social Stories interventions. Most studies reviewed by Tarnai et al. (under review) were set in schools (n=19), fewer studies were conducted in home settings (n=2). All interventions were set around naturally occurring routine activities (e.g., lunch, class, playtime) (see Tables 3; 4). Usually, a teacher or teacher's aid, or the student him/herself if they were literate, read the Social Story prior to the upcoming natural routine in which the target skill was to be applied. Variations of the reading routine included non-disabled peers who read along; and a multimedia story on computer (see Tables 3; 4). This routine was adherent to suggestions from the theoretical literature (e.g., Scott et al., 2000; Gray, 2003) for the implementation of Social Stories (i.e., reading either alone or with help, depending on abilities, and repeatedly prior to target skill practice).

Tarnai et al. (under review) also found that the length of the interventions typically were relatively short, spanning over a total of 4-19 days of treatment. Further, differences existed across studies with respect to the research designs applied (Table 3). Three of the nine reviewed studies used multiple baseline designs, three studies used a classic ABAB design (Kazdin, 1982), and three studies used variations thereof (e.g., ABAC; ABA; ACABA; AB).

Scruggs and Mastropieri (1994) advocate for the utility of the percentage of non-overlapping data points (PND) when judging the outcomes of single-subject research, as opposed to other (statistical) methods of quantifying graphed (visual) results. The PND score represents the proportion of observations that exceeds the measures of a target behavior observed during baseline. In many cases, there are not sufficient data points in single-subject graphs for standard effect size computation, yet PND can easily be obtained. Research conducted by Scruggs and Mastropieri (1994) indicated that PND scores were strongly related to qualitative expert ratings of graphs. In their seminal research the authors recommend that a treatment was not effective unless a PND score was higher than 70 (Scruggs & Mastropieri, 1994). Tarnai et al's (under review) review found that PND scores often were reported in social story implementation studies (n=21 ;Table 4).

Regardless of procedural variation, Tarnai et al. (under review) found that the majority of reviewed studies reported positive outcomes; 14 of the 21 examined cases (67%) reported a PND at or above Scruggs and Mastropieri's (1994) criterion level of 70 (Table 4). However, positive outcomes could be explained by the fact that certain component variables were not systematically manipulated across replicated interventions. For example, in their review, Tarnai et al. (under review) found that three studies (Brownell, 2002; Kuttler et al., 1998; Swaggart et al., 1995) used both adherent and non-adherent sentence ratios (to Gray's recommendations) with different participants within their interventions with inconsistent corresponding outcomes (PND). The authors caution that, because additional variables were not consistent, no clear correlation could be established between the particular sentence ratios used to construct the Social Stories and the respective outcomes.

Another component of treatment efficacy is social validity. Bernstein (1989) argued that a standard of good professional practice in Applied Behavior Analysis was the ability to provide interventions that are not only effective but socially acceptable as well. Social validity can be assessed by examining the acceptability of the goals, procedures, and effects of an intervention as they apply to the consumer, the therapist, and society in large (Bernstein, 1989). Two ways of assessing social validity (Bailey & Burch, 2002) are social comparisons of the procedures used with a student to naturally occurring, typical routines for the student's peers (e.g., the way how students greet a teacher when passing him/her in the hallway); and expert opinions solicited from persons knowledgeable about a factor of interest (e.g., a therapeutic recreation counselor's observation data about how local teenagers spend their leisure time). Tarnai et al.'s (under review) study of their model Social Stories intervention package reported social validity ratings. For this current investigation, specifically, five staff members routinely present in the settings, working with the participants in a social skills training program, were asked to independently rate two questions on a 1-5 Likert-type scale. Social validity rating questions applied to (1) the acceptability of the goals of the intervention; and (2) the unobtrusiveness/ease of implementation

of the intervention (i.e., reading Social Story with student, with as much active student participation as possible, once at the beginning of each Agency Program session) (Table 6).

d. Component Analysis of Social Stories

1. Issues hindering a component analysis of Social Stories. Reynhout and Carter (2006) noted in their review that Gray's (1995; 2003) recommendations for Social Story construction are not based on empirical evidence. Reynhout and Carter (2006) conclude that because of a high degree of procedural variation among reviewed studies, and issues of treatment fidelity, no sufficient experimental control is available to ascertain solid empirically based findings on the efficacy of Social Stories. Hence, the basic problem outlined by evaluators of Social Stories interventions (Barry & Burlew, 2004; Reynhout & Carter, 2006; Tarnai et al., under review) is the lack of a consistent research base that would make interventions comparable along the components of intervention packages. Because many different components are being varied in each study, a comparative component analysis is not possible. Therefore, the relative importance of individual intervention components cannot be established.

As noted previously, Tarnai et al., (under review) reviewed and analyzed Social Stories interventions in the instruction of students with ASD to identify central elements of implemented intervention packages, in order to establish an empirical basis for comparison. Their rationale was that in order to determine if a particular variation of Social Story implementation yielded more effective outcomes than others, a validated and uniform procedure for the intervention had to be isolated and defined, so that systematic experimental manipulations could be introduced. Consequently, Tarnai et al. (under review) identified typical Social Story intervention components. Based on the research literature, the researchers developed and implemented a 10-step model Social Stories intervention package (Table 6; steps #5 and #9, identifying additional strategies and generalization training, were not fully carried out in the basic validation study in order to maintain maximal uniformity of procedures for treatment integrity). Procedural

fidelity was established, and the implementation of the intervention resulted in attainment of behavioral goals.

II. A model Social Stories intervention package to facilitate component analysis. Tarnai et al. (under review) developed a model guide for Social Story implementations, based on the literature review of empirical studies and of recommendations of researchers for the evaluation of Social Stories. The model Social Stories intervention package defined by Tarnai et al. (under review) is used for the purposes of the present study for the evaluation of the relative importance of Gray's sentence ratio and is briefly summarized below. Some model components incorporate commonalities from most of the 21 studies reviewed by Tarnai et al. (under review); and some components are not generally replicated in reviewed studies but needed to be included in the model to ensure empirical research rigor.

Adhering to the common components in empirical literature reviewed by Tarnai et al. (under review), a model Social Story would be used (a) in isolation with no additional contrived strategies such as prompt hierarchies or added reinforcement. (b) The researcher would construct a personalized Social Story in collaboration with those who know the participant well (e.g., teacher, assistants, parents, peers). (c) Initially the teacher or parent, then the participant would read the Social Story aloud just prior to the upcoming natural routine of the day in which the target skill should be applied. (d) Participant(s) would be selected from school-age children diagnosed with ASD, having sufficient language/literacy skills to meaningfully read their personalized Social Story. (e) Settings would adhere to naturally occurring routine activities in which the target skills are desirable and useful.

Regarding intervention components that are not generally replicated in the literature reviewed by Tarnai et al. (under review), the following decisions apply for the purposes of a model Social Story intervention. (f) Following Gray's (1995, 2003) original, defining recommendations, a sentence ratio of two to five descriptive, perspective and/or affirmative sentences for every directive and/or control sentence would be used in the story construction.

(g) Also in Gray's legacy, a comprehension check would be conducted after initial reading of the Social Story and prior to proceeding to skill practice. In order to judge the effectiveness of a Social story intervention, it is important to know if the story is actually meaningful to the participant. This step confirms the match between the participant's and the story's reading level. A mismatch could misleadingly fault the general intervention procedures for unsuccessful outcomes. The readability level of a Social Story is not pre-defined, but rather adjusted to the needs of each participant; if an initial comprehension check fails, the story can and must be re-adjusted (and comprehension needs to be re-checked). (h) In order to keep the model Social Story isolated, no images or other additional materials would be used to enhance the text of a Social Story.

The identified components for a model intervention were organized in 10 steps to ease practical implementation. Table 6 presents Tarnai et al.'s (under review) 10-step approach to constructing and evaluating Social Stories. This structured model was developed not only to summarize the model Social Story components that emerged from the literature review (thus, guiding practitioners through the process of reliably constructing a model Social Story intervention) but also to keep Social Story interventions uniform and replicable, ensuring procedural fidelity. In addition, the 10-step model establishes a basis of comparison for research on the efficacy of components in Social Stories, by enabling researchers to select isolated variables for systematic manipulation while leaving other components constant. Specifically, this study examines the relative importance of applying Gray's sentence ratio within the model Social Story intervention package.

e. Purpose of the Present Study

1. Gray's rationale for a prescribed sentence ratio. Typically, Social Stories are constructed with six basic sentence types (Reynhout & Carter, 2006) that are presented in Table 2. Gray (2003) recommended a ratio of two to five descriptive, perspective, and/or affirmative sentences for every directive and/or control sentence in a Social Story. This sentence ratio lends

distinct formal characteristics, and a contextual basis, to a Social Story. Gray's (1995, 2003) intention in prescribing a sentence ratio was so that social story instruction could provide content that describes rather than directs behavior; thus distinguishing social stories from instructional techniques such as a task analysis (TA) chain.

(1) A TA is a detailed description of each component behavior required to perform a complex behavior (Alberto & Troutman, 2008). A task analysis breaks down specific activities within a cluster of skills into smaller, more easily learned units. The focus of a TA is the identification and teaching of the components skills that need to be carried out for the performance of the complex target behavior (Alberto & Troutman, 2008). Recommended steps for carrying out a TA include: specifying the anticipated goal; breaking the goal in smaller, specific behaviors; sequencing those specific behaviors; and specifying prerequisite behaviors that are readily needed for the performance of the component skills (Neisworth & Wolfe, 2005). The identified component steps are listed in the sequence in which they occur in the performance of the complex target behavior, and they are stated so that they serve as the verbal prompt (e.g., 'Open the socks drawer.') for component skill performance (Brown & Snell, 2005).

A task analysis chain is an explicit guide for both teaching and evaluating the technical performance of a target behavior. However, a TA does not take into account any contextual variables relating to the performance of the skill (e.g., the reasons/need for the performance of the target behavior, or the effects of successful performance for the student and others in the environment). Thus, the purpose of a TA is rather to enable the student to explicitly identify and accurately perform a target skill (Alberto & Troutman, 2008), and not so much the embedment of the target skill into a natural performance routine.

(2) Providing a context in which to perform certain skills is a central feature of Social Stories, as outlined by Gray (1995; 2003). Gray's (1995) rationale is that students with ASD typically don't fail to learn a skill in an isolated form but rather have difficulties understanding the social contexts in which a skill (whether newly learned or already in the student's repertoire)

should appropriately be applied. Thus, Gray has recommended the use of an extensive social-contextual framework to highlight such cues and explanations (e.g., when to display a certain behavior and when to restrain from it, what level of performance is desirable and why), in addition to other, empirically-based instructional strategies.

II. Related research support for Gray's social-contextual framework. Although Gray's (1995; 2003) recommendations for Social Story construction are not based on empirical evidence (Reynhout & Carter, 2006), her recommendations for a social-contextual framework have some relevant research support in the literature. For example, Khemka (2000) and Khemka, Hickson, & Reynolds, (2005) examined the effectiveness of two decision-making training approaches in increasing independent decision-making skills of adults with mild mental retardation in response to hypothetical social interpersonal situations. One decision-making training approach addressed both cognitive (i.e., knowledge of facts) and motivational (i.e., personal and community values; goal-awareness and goal-directedness) aspects of decision-making; the other approach included instruction only on the cognitive aspect of decision-making. Although both approaches were effective relative to a control condition, the combined cognitive and motivational training approach was superior to the cognitive only training approach. The superiority of this approach also was reflected on a locus of control scale that measured perceptions of control.

Another study supporting Gray's social contextual relevancy was conducted by Scott et al. (2000). These authors suggest that social communication training for individuals with autism should involve instruction on 'who to ask' and 'when to ask' beyond the technique of asking a question, that is, 'what words to use' (pp. 257). Finally, Morgenstern and Morgenstern-Colón (2002) outlined organization questions for young teens to ask themselves before arranging their study space, such as what is and is not working for them in the current arrangement, what are the most important items to be kept accessible, what is the benefit of organizing the area, and what are problems that caused disorganization in the past. After such (contextual) organizing

questions, a plan and task analysis for re-arranging their study space could be developed. Myles (2005) gave further examples of organizational strategies for youth with ASD in three steps before they get to an actual task: (1) analyze the current situation; (2) strategize the task at-hand; and then (3) attack with a plan (pp. 32). These research findings and suggestions parallel Gray's recommendations (1995; 2003) to add a broader social-context as a frame of reference to a purely technical instruction of how a skill is performed.

III. Evaluation of Gray's sentence ratio. The lack of a consistent research base that could make interventions comparable along the components of intervention packages represents the basic issue outlined by evaluators of Social Stories interventions (Barry & Burlew, 2004; Reynhout & Carter, 2006). The model 10-step approach to constructing Social Stories for students with ASD (Tarnai et al., under review) outlined in Table 6 can be applied to establish a 'common ground' for a component analysis. Once the 10 step model is applied, Gray's sentence ratio can be examined through systematic manipulation. For example, Social Stories grounded in Gray's social contextual model can be compared with Social Stories grounded in the directive model based on task analysis.

For this purpose, a 10-Step Social Stories intervention model (Table 6) including Gray's sentence ratio (i.e., a 'contextual' Social Story), and a similarly composed method omitting Gray's sentence ratio (i.e., a 'directive' Social Story), is compared in teaching table setting skills to students with ASD. The only formal instruction given consists of reading one of the Social Story versions (contextual or directive; i.e., with or without Gray's sentence ratio) individually with each participant, prior to the activities of daily social skills training sessions that the participants routinely participate in. In this study, the term 'contextual' Social Story identifies a Social Story constructed adherently to Gray's (1995; 2003) recommendations, including her sentence ratio of two to five descriptive, perspective, and/or affirmative sentences for every directive and/or control sentence (Table 2) in a Social Story. The term 'directive' Social Story

identifies a Social Story constructed adherently to Gray's (1995; 2003) recommendations, but, as a sole difference, excluding her sentence ratio.

An overtly directive text of a 'directive' Social Story, purely based on, and following the steps of a TA of the target skill, mainly directing performance and omitting social-contextual information, would represent a counterpart of the 'contextual' Social Story intervention that is but minimally different in form, yet substantially opposite in objective. Typical task analytic skill instruction focuses on explicitly teaching, prompting and guiding the student's performance of a target behavior (Brown & Snell, 2005; Neisworth & Wolfe, 2005). A directive Social Story version would not go beyond this intent, but it would take the formal appearance of a narrative text (i.e., Social Story written: a) in the first ["I"] and/or third person ["he/she/they"]; b) in present or future tense; c) at the reading/comprehension level of the student; d) Social Story labeled with a title that quickly relates to the topic; e) the story is given an introduction, body, and conclusion; f) the story states behaviors positively ["do" vs. "don't"]; see Step #4 in Table 6) versus a TA list of isolated verbal prompts for each component skill to be performed (Brown & Snell, 2005).

The contextual Social Story version would include additional social-contextual information beyond the skill performance steps. The added information would be quantified and organized in certain proportionately present sentence types (Table 2) through the specific vehicle of Gray's sentence ratio that she has established to control for descriptiveness vs. pure directivity (Gray, 1995; 2003). With a given ratio of non-directive sentence types (i.e., Gray's originally intended Social Story version), the introduction, body, and conclusion of a contextual Social Story is forced to provide extra contextual information as defined by each sentence type (Table 2). Gray has regarded this as a crucial distinctive characteristic of Social Stories from a mere task analysis (Gray, 1995) that would be similar to the directive story version that is created for the present study as a narrative to instrument a component analysis.

Dependent measures include student outcome indicators such as percentage of criterion attained (based on pre-defined task analysis steps); and number of necessary trials to criterion.

These dependent measures are practical measures of teaching efficiency. Previous research mainly has focused on skill acquisition and PND measures (Tables 3; 4) to examine the overall efficacy of Social Stories as instructional tools. However, the examination of teaching efficiency as a novel outcome measure would have pragmatic significance and thus would justify the effort and preparation time needed to construct a personalized Social Story adhering to Gray's guidelines (specifically, adherence to her sentence ratio).

IV. Research questions. The present study aims to establish the relative importance of applying Gray's sentence ratio as a component in a Social Stories intervention package. Research questions include: (a) Is there a difference between a contextual Social Stories intervention package including Gray's sentence ratio, and a directive Social Stories intervention omitting Gray's sentence ratio, for teaching social skills to students with ASD, on performance measured by percentage of criterion attained?; and (b) on performance measured by number of trials to criterion? In addition to these primary dependent measures, (c) the placement of an additional utensil (i.e., napkin) not included in the Social Stories for table setting will be recorded during baseline and intervention; to explore the possibility of generalization-across-behaviors of the social-contextual message of the contextual Social Story version (i.e., adhering to Gray's sentence ratio) that emphasizes the advantages of the predictability of a certain place setting.

Chapter 3. Research Method

This study sought to establish the relative importance of applying Gray's sentence ratio as a component in a Social Stories intervention package to teach social skills to students with ASD. Research questions included: Is there a difference between a contextual Social Stories intervention package including Gray's sentence ratio, and a directive Social Stories intervention omitting Gray's sentence ratio, (a) on performance measured by percentage of criterion attained (based on pre-defined task analysis steps); and (b) on performance measured by number of trials to criterion? Additionally, (c) the placement of a utensil (i.e., napkin) not included in the Social Stories for table setting will be recorded during baseline and intervention; to explore the possibility of generalization-across-behaviors of the social-contextual message of the contextual Social Story version (i.e., adhering to Gray's sentence ratio) that emphasizes the advantages of the predictability of a certain place setting.

a. Participants/Settings

The study was carried out in collaboration with the 'Agency Program' (name altered) of a human service agency in Pennsylvania. The Agency Program is a social skills training program serving approximately 15-20 school-age children per session (age range: 9-13 years) diagnosed with ASD. In the summer, when the study was conducted, the program met four to five times a week for six hours a day. The program included diverse structured and guided activities under the supervision of certified staff.

Participants for the study were selected from the pool of students with ASD attending the Agency Program summer sessions who displayed sufficient language/literacy skills to meaningfully read a personalized Social Story and to successfully answer related comprehension questions. Comprehension checks confirmed the match between participants' and their story's reading level, so no expectations of a reading level were pre-established beyond minimal, second-grade ability to read a continuous text, and to answer related comprehension questions with 100% accuracy (explained in detail below, under Implementation).

b. Identification and Training of Project Staff / Informed Consent

Three staff members of the Agency Program were identified by the program coordinator to participate in the study. The program coordinator and two additional staff members, all of them familiar to the children in the Agency Program, read the personalized Social Stories with the four participating students. The principal investigator provided staff training in a small-group format prior to the intervention, introducing the procedures of treatment implementation (i.e., Social Story readings), skill practice routines (i.e., table setting for group snack time), and observation/scoring. The principal investigator also conducted treatment fidelity checks to assure consistency in the implementation (see Reliability/Fidelity below for criteria). Agency staff sent out information and recruitment materials to the parents of children having ASD. Informed consent for participation was obtained in writing from the parents of six potential participants.

c. Pre-Implementation Procedures

1. Assessment of potential participants. Based on parental/staff report and direct observation during baseline performance, participants' hearing and vision was in the normal range. All participants were able to read (and routinely participated in chronological-age matched grade-level, inclusive classes with peers without disabilities) and used verbal speech for communication. After informed consent was obtained, potential participants were given two formal assessments to determine their eligibility to participate in the study: (1) one instrument related to reading level and (2) a second instrument related to communication skills.

(1) Because Social Stories can and should be individualized for each student's reading and intellectual skills, participation criteria for literacy were based and assessed on a minimum, second grade oral reading fluency benchmark for a continuous text (DIBELS by Good & Kaminski, 2007; Appendix B, and Table 7). DIBELS reading fluency probes were created, conducted, and scored according to DIBELS guidelines (Good & Kaminski, 2007). All six potential participants passed the benchmark; and they typically read well at their actual grade level (all participants attended some inclusive classes; Table 7).

(2) A communications skills profile also was completed using the Communication Matrix™ (Rowland, 2004) (Appendix A; and Table 7). The Communication Matrix™ (Rowland, 2004) assesses communication abilities via parent/professional interview. The assessment places participants on one of the following seven hierarchical levels of communication: (I) pre-intentional behavior; (II) intentional behavior; (III) unconventional communication; (IV) conventional communication; (V) concrete symbols; (VI) abstract symbols; or (VII) language use.

The program coordinator of the Agency Program provided the data for completing the profiles of the potential participants. All six participants have scored Level VII (i.e., language: rule-bound use of symbol system, ordered combinations of two or more symbols according to syntactic conventions; see Appendix A). Thus, potential participants have demonstrated oral communication abilities (as opposed to alternative means of expression) in all four main categories of refuse, obtain, social, and information; and within all applicable sub-categories of (a) obtain: requesting more action, requesting new action, requesting more objects, making choices, requesting new object, requesting absent object; (b) social: requesting attention, showing affection, greeting people, offering/sharing, directing another's attention, polite social forms; and (c) information: answering yes/no questions, asking questions, naming things/people, making comments (see Appendix A, and Table 7). The data provider (the program coordinator of the Agency Program) has pointed out that although all six participants had the ability to use language (standard American English) for communication in all tested areas, they typically (as for ASD) do not often initiated, or engaged in, extensive oral communication in Agency Program sessions as much as they abilities would allow.

Because potential participants were assessed as having adequate reading and verbal communication skills, all six participants were included in the study. Six male students participated in the study (no females participated in the Agency Program sessions in the summer). Information was obtained on age, literacy and communication skills, diagnosis, and school placement of participants (Table 7).

II. Identification of dependent measures. Each participant was taught the skill of formal table setting for their Agency Program peers at snack time via a contextual or a directive Social Story. For the current study, table courtesies applicable at group snack times were considered by project staff because individual servers/other assigned jobs were a routine part of Agency Program sessions (e.g., distributing cups or napkins, wiping tables clean). Table setting was selected, defined (setting format based on professional culinary service recommendations by Ridges & Curtis, 2004), and broken down into discrete steps like in a task analysis (Appendix C) in collaboration with Agency Program staff.

As described earlier, Tarnai et al. (under review) reviewed 21 individual Social Story implementation scenarios (Tables 3; 4). Targeted social behaviors in the reviewed studies were not limited in nature (e.g., by any definition as of what constituted a social skill). The reviews rather indicated that common to the studies were target behaviors that needed to be either avoided or displayed (inappropriate vs. appropriate behaviors, respectively) within a given social context. With this in mind, the principal investigator and Agency Program staff have judged the Agency Program's snack-time table setting routine as appropriate to be targeted with the present Social Stories project (see Table 8 for staff members' formal social validity ratings on the acceptability of the goals). Table setting as a technical skill does not necessarily have a social aspect in itself, but at the Agency Program, students were expected to set tables for their peers and the whole snack time was regarded as an opportunity to socialize. Thus, the performance of the table setting skill was embedded in a social context and it was emphasized that each student, on a rotating basis, had the opportunity to serve their peers.

Student performance was measured on (a) criterion level (criterion = 100% of the task-analyzed skill steps [Appendix C] performed appropriately); and (b) the number of trials-to-criterion (reaching a consistent/continuous performance of 100% of the task-analyzed skill steps). In addition to these primary dependent measures, (c) the placement of the napkin in the table setting task – even though not included in the Social Stories (Appendix C; D; E) – was

recorded for all six participants during baseline and intervention. This ancillary dependent measure was added to explore the possibility of response generalization linked to the social-contextual message of the contextual Social Story version about predictability of the place setting: “Is there a reason why this place setting came to be a tradition? If people do things, like setting the table, in a similar way all the time, everybody will learn how this is done. People would find the same set-up when they go to a restaurant or to a friend’s house. This way, people will not be surprised, and they will easily find everything they need at the table, right where they learned it should be” (quoted from the contextual Social Story book; see Appendix E).

Response generalization, or generalization across behaviors, refers to the extent to which the learner performs a variety of functional responses in addition to a trained response; that is, responses for which no specific contingencies have been applied are altered as a function of the contingencies applied to other responses (Cooper, Heron, & Heward, 2006). Some responses emitted because of the effects of reinforcement may differ topographically but share enough common elements with trained responses to produce the same consequence as those trained responses. Such responses comprise a functional response class (Cooper et al., 2006). Thus, generalization across behaviors can occur by reinforcing a few members of a functional response class that results in other members of the response class being strengthened as well.

In the present study, participants were handed napkins along with the other utensils mentioned in their Social Stories (i.e., plates, cups, forks, knives, and spoons; Appendix C; D; E). Any questions raised by the participants about the placement of the napkin were answered with the pre-coded response by staff: Do as you think it would be best. The questions themselves were recorded. The message on the importance of consistency / predictability was only included in the contingencies of the contextual Social Story, as added social-contextual information. Hence, response generalization regarding napkin placement would more likely be

expected to result in consistency when implementing the contextual story version than with the directive Social Story.

III. Definition of independent measures. To test the veracity of Gray's sentence ratio, two versions of the table setting task were developed: a contextual (i.e., including Gray's sentence ratio; step #4g in Table 6) and a directive (i.e., omitting Gray's sentence ratio) Social Story text. Thus, the independent measure in the study was instruction in table setting using either a contextual (i.e., including Gray's sentence ratio) or a directive (i.e., omitting Gray's sentence ratio) Social Stories intervention package designed according to the 10-step approach (Table 6). The intervention consisted of Agency Program staff reading aloud the participants' personalized Social Stories with them (in individual staff-student pairs) one time at the beginning of each Agency Program session, with as much active student reading input as possible. Comprehension questions were answered after initial reading (100% mastery expected, otherwise the stories would be modified as needed; see in detail below under Implementation).

Because independent performance was expected from the participants during the snack time routine, removed in time from the training (i.e., reading of Social Stories at the beginning of each Agency Program session), even though task-analyzed steps guided both the construction of Social Stories and performance scoring, no prompt hierarchy (e.g., independent performance / verbal / model / physical guidance) was applied during skill practice as would routinely be done in task analysis-guided training (Alberto & Troutman, 2008). In fact, one possible practical advantage of Social Stories in some instructional situations may be that instruction is 'removed' from skill practice in the actual settings and from actual expected performance times; thus, the intervention becomes relatively unobtrusive (see social validity ratings; Table 8) and requires low performance guidance / supervision from the instructor at actual performance times (Scott et al, 2000). Accordingly, the only formal instruction given consisted of reading one of the Social Stories versions (contextual or directive; i.e., with or without Gray's sentence ratio) prior to the activities of the Agency Program sessions.

IV. Social Story construction. The principal investigator and Agency Program staff conducted an ecological inventory and developed task-analyzed steps for the target behavior of table setting for group snack time. Appendix C presents the task analysis of the performance steps that were embedded in the Social Stories. Based on these skills-steps, personalized Social Stories were developed, according to student reading levels; in both the contextual and directive versions (differing only on Gray's sentence ratio). Adhering to Tarnai et al.'s (under review) 10-step approach (Step #4; Table 6), the principal investigator in collaboration with the Agency Program coordinator wrote the basic Social Story text: a) in the first ("I") and third person ("he/she/they"); b) in present and future tense; c) at the comprehension level of the participants (comprehension check questions were prepared for initial reading); d) with a title that quickly related to the topic (i.e., How do I set the table for my friends at Agency Program at snack time?); e) formatted and given an introduction, body, and conclusion; f) with behaviors stated positively ("do" vs. "don't"); and g) with Gray's sentence ratio in the contextual Social Story version. Appendix D includes the basic directive Social Story, and Appendix E includes the basic contextual Social Story.

The contextual Social Story constructed for the intervention (Appendix E) intended to maintain Gray's sentence ratio of two to five descriptive, perspective and/or affirmative sentences for every directive and/or control sentence (Table 2). Thus, the adherence to Gray's sentence ratio (step #4g; Table 6) was only checked for procedural fidelity for the construction of the contextual Social Story. The principal investigator and an expert in communication sciences and disorders independently coded the sentences of the basic story to identify them as either type 1 (descriptive, perspective and/or affirmative sentences) or type 2 (directive and/or control sentence). The ratio of type 1 to type 2 sentences was calculated for the contextual Social Story (Appendix E) by each rater. For an agreement, the ratio had to be between 2.00 and 5.00 as judged by both raters (i.e., Gray recommended using two to five descriptive, perspective, and/or affirmative sentences [type1] for every directive and/or control sentence [type2]; the dividend {#

of type1 ÷ # of type2} had to be >2 and <5). Inter-rater agreement was calculated by dividing the number of agreements by the sum of agreements plus disagreements, multiplied by 100 (paralleling agreement-per-occurrence; Salvia et al., 2006). Inter-rater agreement for adhering to Gray's sentence ratio was 100%; the obtained sentence ratio averaged at 3.57.

The readability of the Social Stories was also checked with the participants. Appendix D includes the basic directive Social Story, and Appendix E includes the basic contextual Social Story; written at a 4.6 reading grade level (according to Microsoft Word's Flesh Kincaid Grade Levels). Although this reading level was above the minimum participation criterion of second grade level, it matched the average (end-of-year) actual grade level of the participants (Table 7). All six participants were able to read their assigned (directive or contextual) stories fluently at initial reading.

A comprehension check was conducted after the initial reading of the Social Stories and prior to proceeding to skill practice. Three pre-formulated comprehension questions (Appendix D; E) related to key information presented in the stories and were printed on the inside back cover of the individual story books. The questions were to be read immediately after the Social Story at each session until the participant could answer all questions (100% correct), to demonstrate comprehension of the concepts in his story. In case of apparent difficulties, the given Social Story formulation would be altered (see step #8; Table 6) for clearer understanding, to match the participant's needs and/or reading level. All six participants successfully answered the comprehension questions after initial reading. Thus, the basic Social Stories (Appendix D; E) were used for the intervention with all six participants; and even though individualization would have been possible and even obligatory if needed, for the selected six participants no modifications were shown to be necessary.

V. Materials. The Social Stories and comprehension questions used in the current study were printed on white paper with a 16-point font, one paragraph per page. The contextual Social Story, containing more (social-contextual) information, was slightly longer than the directive

Social Story; the difference was accounted for by just one additional sheet (two single-paragraph pages) in the contextual story book. The pages were mounted on mixed-color letter size construction paper sheets, the white paper trimmed so that each page was framed by a strip of color showing from the construction paper background. The pages were stapled together to form a personal story book for each participant. The outside cover page displayed a summative title in a question-format (i.e., How do I set the table for my friends at 'Agency Program' at snack time?), to which each story represented an answer. The story books were hole-punched, mounted on a metal ring, and hung up on hooks in a designated area on the Agency Program room's wall (Appendix F), so the participants could access their own stories any time.

d. Implementation Procedures

I. Reading of Social Stories. The Social Stories intervention consisted of Agency Program staff reading aloud the participants' personalized Social Stories with them (in individual staff-student pairs) one time at the beginning of each Agency Program session. The stories were read with the participants while they were seated at a table in a small, quiet, non-distractive room of the Agency Program area, where the routine activities of the Agency Program sessions occurred, and in which the target behaviors would naturally be displayed. Participants were asked to come sit with a familiar staff member who then read the participants' personalized Social Stories with them. The Social Stories were read before activities started at each Agency Program session, with as much active student reading input as possible (depending on literacy skills of participants). For example, if a participant struggled with a word or phrase, staff would read aloud those words to them to ensure a fluent and meaningful reading of the stories.

Eventually, a fading schedule (step #10; Table 6) was introduced by gradually shortening each story. In case that the participants read their stories fluently (i.e., staff did not need to help with more than three words), and a change in the performance of the target behavior could be observed during intervention sessions; the intervention was put on a fading schedule by gradually shortening the text of the stories. Specifically, both versions (directive or contextual)

were to be gradually shortened by leaving out one, then two paragraphs from the beginning of the Social Stories. These described more the general settings of the Agency Program and gave a larger context to the target behavior, whereas the latter paragraphs focused more directly on the performance and explanation of the target behavior (Appendix D; E). The realization of the planned fading schedule for each participant is presented in Chapter 4 (Research Findings).

II. Organization of target behavior performance. At snack times, once at mid-point during each Agency Program session, some students were routinely asked to help set-up for others, while the other students lined up and went to a bathroom to wash their hands. For the purposes of this study, a schedule was created to ensure that all six participants were called to be on-duty for table setting sufficient times for baseline data collection, and so that they would be on-duty for table setting in the right order for the tiers of the matched-pairs multiple baseline design (see below). Each participant was observed for three baseline and four intervention sessions.

Two participants (belonging to the same matched pair; see Research design) were on-duty for table setting each session. Each participant was asked to set a table for four students. The two tables for them to set were positioned at walls facing each other in the dining area, so the participants were working on the table setting task at their own tables facing opposite directions. Participants were asked to please set the table for snack time for their friends. Then they were handed four plates, four forks, four knives, four spoons, four cups and four napkins each, handed to them in one pile. At their first intervention sessions, participants were reminded to remember some instructions for the task they read about earlier that morning, and that their instructions may be different and given personally just for them in their own stories. No further instructions or prompts were given, and any questions raised by the participants were answered with the pre-coded response: Do as you think it would be best.

e. Data Collection and Analysis

I. Research design. A matched-pairs multiple baseline design (Figure 1) was used. Two versions of instruction ('contextual' and 'directive' Social Stories; with or without Gray's ratio)

were conducted with the participants. Two participants were paired on each of the three tiers of the multiple baseline design (A = baseline phase in Figure 1); one participant of each matched pair received instruction through a contextual Social Story (intervention B in Figure 1), the other participant received instruction through a directive Social Story (intervention C in Figure 1). As described earlier, participants of the present study were similar in gender, age, literacy and communication skills so matched participant pairs could be created through random assignment.

An adapted (i.e., matched-pairs) multiple baseline design was chosen to counteract multiple-treatment interference or order/sequence effects that may have emerged in multiple or alternating treatment designs (Kazdin, 1982). When more than one treatment is administered to each participant, the possibility exists that the effect of one treatment may be influenced by the effect of another treatment (Campbell & Stanley, 1963). In any design in which two or more treatments are provided to the same participant, such multiple-treatment interference may limit the conclusions that can be drawn (Kazdin, 1982). Order or sequence effects refer to the specific succession of multiple treatments that are administered to the same participant, in which case that specific order of several treatments may cause an effect that would not be observed either with a different sequence or just a single intervention (Cooper et al., 2006).

Within the matched-pairs multiple baseline design of the present study, each participant was administered only one treatment (i.e., either the directive or the contextual version of Social Stories). Comparisons of performance for contrasting the two versions of treatment were conducted between as opposed to within participants (i.e., baseline-treatment successions); contrasting comparisons were possible either between those participants making up each matched pair, or comparing the performance of several participants receiving the same, one or the other version of treatment during the intervention phase across the three matched pairs.

II. Scoring and graphing performance. Baseline and treatment data were collected by recording performance relative to (a) criterion level (percentage of task-analyzed skill steps performed correctly); and (b) the number of trials-to-criterion. Data collected during baseline and

treatment observations were graphed (Figure 2) and visually inspected. In addition, (c) response generalization data were collected on the placement of the napkin, along with any questions asked by the participants about napkin placement. Placement codes and questions were charted in a compact visual format for an easy overview and comparison (Figure 3).

For (a) scoring the placement of each utensil, a 'whole task' system, similar to whole-interval recording, was selected. Specifically, on the finished table setting, all four of the same kind of utensil mentioned in the Social Stories and handed to the participants (i.e., four plates, forks, knives, spoons and cups) had to be in the correct position (as described in Appendix C; D; E) in order for the response to be counted as 'correct' for the corresponding TA step. If one or more utensils of the same kind were out-of-place, no score was given for that task analysis step. This 'whole-task' recording system was selected because the target behaviors needed to be increased, and whole-interval / 'whole-task' recording tends to underestimate behavior, hence represents a more conservative system when judging increase in behavior (Bailey & Burch, 2002). When assigning a percentage of task-analyzed skill steps performed correctly, each 'correct' score was worth 20% ($5 \text{ TA-steps/utensils} \times 20\% = 100\%$). This percentage represented the actual criterion level score recorded for data analysis (Figure 2).

For (b) the number of trials-to-criterion, the number of intervention sessions were added up until the first full criterion level score (100%) was achieved. For instance, if a participant scored 60% of criterion in the first intervention session and 100% of criterion in the second intervention session, '2' was recorded for trials-to-criterion score (Figure 2). If no 100% criterion score could be assigned for a given participant at any session, 'N/A' (not applicable) was recorded as their trials-to-criterion score.

For (c) the ancillary dependent measure, the placement of the napkin (not mentioned in the Social Stories) was observed as response generalization check. Since the contextual Social Stories emphasized the importance of predictability of the placement (referring to the trained responses of positioning plates, cups, forks, knives, and spoons), successful application of the

predictability principle to a similar but untrained utensil to be positioned (i.e., the napkin) would result in consistent (i.e., predictable) placement. When recording data, any (consistent) placement of the napkin was acceptable (because no specific position was prescribed in the Social Stories, as opposed to the other utensils). Thus, the consistency principle defined a topographically broad response class.

The possible spatial positions for the napkin in relation to the other utensils were coded (L=left side of plate; R=right side of plate; U=under utensil[s]; P=on plate; O=over above plate) and recorded for each participant in each session (Figure 3). Combined placement codes were possible to be assigned (e.g., R;U = right side of plate and under utensil[s]). Questions raised by the participants about the placement of the napkin were answered with the pre-coded response: Do as you think it would be best (and the questions themselves were recorded; see Figure 3).

f. Treatment Integrity and Reliability of Observations

The principal investigator and the program coordinator of the Agency Program independently monitored the applicable steps of implementing a Social Story (Table 6). Using the evaluation column of the form presented in Table 6, raters tallied the steps that were appropriately carried out during the process of implementing the Social Stories. Over time, some steps became redundant (e.g., behaviors were only defined once, and stories [with sentence ratios] became finalized; either baseline or intervention data were collected, etc.); non-applicable steps were not re-checked at each session. Step #5 (identifying additional strategies; see Table 6) was purposefully not carried out in the present study; in order to maintain the purest minimal forms of procedures for a focus on Gray's sentence ratio. Appendix G shows a sample rating sheet for treatment integrity, based on Table 6, with applicable steps initialed (i.e., rated as carried-out) by one of the raters.

Inter-rater agreement for the two raters was calculated by dividing the smaller number of tallied steps by the larger number of tallied steps, multiplied by 100 (Salvia, Ysseldyke, & Bolt, 2006). Total inter-rater agreement for following the procedures for constructing and

implementing Social Stories was 100%; with all applicable steps eventually tallied (i.e., rated as carried-out).

The principal investigator served as the primary observer for data collection during target skill performance (i.e., table setting). The program coordinator of the Agency served as co-observer for reliability checks of the observations. Approximately 20% of all sessions (8 of 42) were co-observed (adhering to recommendations by Kazdin, 1982). Retraining would occur if observers did not attain a minimum of 90% agreement on observations conducted intermittently throughout the study.

Reliability of observations on the primary dependent measures were calculated as a percentage, based on the individual scores for (a) percentage of criterion (based on pre-defined task analysis steps) attained; and (b) number of necessary trials to criterion, using the formula: lower score divided by higher score multiplied by 100 (Kazdin, 1982; Salvia et al., 2006). Inter-rater agreement for (c) the placement of the napkin (ancillary response generalization component) was calculated by dividing the number of agreements by the sum of agreements plus disagreements, multiplied by 100 (agreement-per-occurrence; Salvia et al., 2006). Overall mean inter-rater agreement for the reliability of observations was 93.2% with a range from 86.58% – 100%.

Chapter 4. Research Findings

The present study sought to establish the relative importance of applying Gray's sentence ratio as a component in a Social Stories intervention package; using a matched-pairs multiple baseline design with six participants. Research questions included: (a) Is there a difference between a contextual Social Stories intervention package including Gray's sentence ratio, and a directive Social Stories intervention omitting Gray's sentence ratio, teaching table setting skills to students with ASD, on performance measured by percentage of criterion attained (based on pre-defined task analysis steps)?; and (b) Is there a difference between a contextual Social Stories intervention package including Gray's sentence ratio, and a directive Social Stories intervention omitting Gray's sentence ratio, teaching table setting skills to students with ASD, on performance measured by number of necessary trials to criterion? (c) In addition to these primary dependent measures, the placement of the napkin – even though not included in the Social Stories – was recorded, along with any questions of the participants about napkin placement, for exploring the possibility of response generalization linked to the social-contextual message of the contextual Social Story about consistency/predictability of the place setting.

a. Implementation – Independent Measures

1. Individual Social Story Readings. A routine for reading the Social Stories once at the beginning of each Agency Program session (Monday through Friday; Wednesdays occasionally off for a field trip) in individual staff-student pairs was quickly established, as outlined in the Method/Procedures; and the students at the Agency Program were used to staff-observers around them with note pads collecting data (Agency Program staff regularly collects their own behavioral data on the students). All six participants were able to read their stories independently after the initial reading by a staff member and successfully answered 100% of comprehension questions. Nonetheless, continuing stand-by help was offered (even though scarcely needed and used) throughout the intervention by the assigned staff partners, so that the reading would maintain a meaningful fluency.

II. Fading of Social Stories. Because all six participants read their stories fluently (i.e., staff did not need to help with more than three words) during intervention, and a change in the performance of the target behavior could be observed in all cases after as few as two intervention sessions (Figure 2); the intervention was put on a fading schedule (Table 6, step #10) by gradually shortening the Social Stories, beginning at the third reading. Specifically, the stories were gradually shortened by leaving out one, then two paragraphs from the beginning of the stories. Due to the short intervention period, it was not practical to shorten the stories more (even though a more radical fading schedule was shown to still work effectively; see Tarnai et al., under review). The sentence types (Table 2) in the first two paragraphs of the contextual Social Story (Appendix E) were varied, so that the controlled fading out of these parts of the story has not affected the realization of Gray's sentence ratio (slight increase from 3.57 to 3.80; acceptable range is 2.00 – 5.00).

III. Table setting routines. The two tables that the two paired participants were asked to set were positioned at walls facing each other in the dining area, so the participants were working on the table setting task at their own tables facing opposite directions (see Method). At their first intervention sessions, participants were briefly reminded that their instructions they read about earlier may be different and given personally just for them in their own stories. Such precautions were taken because carry-over effects through the paired participants' possibly looking at and copying each other's behaviors could have represented a serious confounding influence on the performance of the participants. However, no obvious carry-over effects were observed, neither during baseline nor during intervention, for any of the matched pairs and any of the dependent measures (Figures 1; 2). In fact, performance remained consistent within, but varied across, participants:

b. Dependent Measures

I. Criterion level. Figure 2 shows the performance graphs of the participants as of the percentage of task-analyzed skill steps (Appendix C) performed correctly. Five participants

demonstrated improved performance of the target behaviors immediately after the first intervention session and the sixth participant, Jonathan, following the second intervention session. Performance levels consistently remained above corresponding baselines. Five participants reached 100% of criterion. One participant's (Chris) performance reached a plateau at 80%. Three participants (Jonathan, Grant, Bruce) reached a stable plateau at 100%. Within the matched pairs, participants did not copy each other's behaviors and their performances remained distinct in both baseline and intervention sessions (Figure 2).

The three participants who read the contextual Social Story (Jonathan, Grant, Bruce), demonstrated more consistent and stable performance during intervention than the readers of the directive Social Stories. Further, the three participants who read the contextual Social Story all reached a plateau at 100%, whereas none of the directive Social Story readers did (Figure 2).

II. Number of trials-to-criterion. Figure 2 notes the number of intervention sessions necessary to reach 100% performance level criterion. Five participants obtained 100% performance levels (with Chris as the only exception). Two contextual Social Story readers (Jonathan and Grant) reached 100% of criterion after 2 trials, and the remaining one contextual Social Story reader (Bruce) needed only one trial to reach criterion. Once reaching criterion, all three contextual Social Story readers (Jonathan, Grant, Bruce) have maintained their performance at criterion level.

Chris, a reader of the directive Social Story, did not reach 100% performance level criterion. The two other directive Social Story readers who did reach criterion (Matthew and Jimmy) both needed three trials to reach criterion. However, they (Matthew and Jimmy) both regressed in their performances and did not maintain a stable plateau during the intervention phase (Figure 2).

III. Generalization data. Response generalization data were collected on the placement of the napkin (not included in the Social Stories but given to participants with the other utensils for setting the table). In addition, questions asked by the participants about napkin placement were

noted. Figure 3 presents the placement codes and questions asked by participants, for indication of response generalization. Similar to the variables charted in Figure 2, performance on this generalization check did not show evidence of participants within the matched pairs copying each others' behavior, neither in baseline nor in intervention.

None of the six participants demonstrated consistent napkin placement during baseline. During intervention, all three directive Social Story readers (Matthew, Chris, Jimmy) had variability in the napkin placement. All three contextual Social Story readers (Jonathan, Grant, Bruce) showed stable and consistent patterns of napkin placement during all intervention sessions. Bruce (a contextual Social Story reader), the only one participant having done so, adapted a napkin placement in the treatment sessions that he had not at all used during baseline; and Jimmy, his matched pair, has not used/copied that position either (Figure 3). All three contextual Social Story readers (Matthew, Chris, Jimmy) asked a question about the napkin's placement (Grant and Bruce in the first, Jonathan in the second intervention session). None of the directive Social Story readers (Matthew, Chris, Jimmy) asked questions (Figure 3). Questions about the placement of the napkin were answered with the pre-coded response: Do as you think it would be best.

c. Social Validity

The selected target behavior of table setting was preliminarily judged by Agency staff as age appropriate and socially valid for this group of 9-13 years of age to perform. Later in the course of the intervention, five staff members were asked to give formal social validity ratings on the acceptability of the goals using a 1-5 Likert-type scale. Table 8 lists the questions (based on quotes from the Social Story books) used to rate the social acceptability, the rating code (i.e., verbalized evaluation assigned to the numbers 1-5), and the obtained social validity ratings per question and staff member, plus total average ratings per question. Total average inter-rater score for the acceptability of the goals was 4.40 with an individual range from 3 – 5, on the 1-5 Likert-type scale.

Five staff members were asked to give social validity ratings on the unobtrusiveness / ease of implementation of the intervention, defined for this purpose as: reading Social Story with student, with as much active student participation as possible, once at the beginning of each Agency Program session. Table 8 shows the actual questions to rate (based on quotes from the Social Story books), the rating code using a 1-5 Likert-type scale, and the obtained social validity ratings per question and staff member, plus total average ratings per question. Total average inter-rater score for the unobtrusiveness and ease of implementation was 4.40 with an individual range from 4 – 5, on the 1-5 Likert-type scale.

Chapter 5. Discussion

Reviews (Barry & Burlew, 2004; Reynhout & Carter, 2006; Tarnai et al., under review) have indicated that Social Stories have been in use for over a decade, since they were introduced in 1995 (Gray, 1995). Further, they continue to be widely used with a focus on diverse social skills in the instruction of children with varying degrees of severity of ASD (Barry & Burlew, 2004; Reynhout & Carter, 2006). However, the strategy has been used without a common framework, and without empirical research support for the relative efficacy of certain components of Social Stories intervention packages in practical implementation (Reynhout & Carter, 2006; Tarnai et al., under review).

This study sought to establish the relative importance of applying Gray's sentence ratio as a component in a Social Stories intervention package teaching table setting skills to students with ASD. Research questions included: Is there a difference between a contextual Social Stories intervention package including Gray's sentence ratio, and a directive Social Stories intervention omitting Gray's sentence ratio, (a) on performance measured by percentage of criterion attained (based on pre-defined task analysis steps); and (b) on performance measured by number of necessary trials to criterion? (c) In addition to these primary dependent measures, the placement of the napkin – even though not included in the Social Stories – was recorded, for exploring the possibility of response generalization linked to the message of the contextual Social Story about consistency/predictability of the place setting.

Results suggested that when leaving other intervention components constant in a 10-step approach to constructing and implementing Social Stories (Tarnai et al., under review), a contextual Social Story (adhering to Gray's sentence ratio) yielded fewer trials to criterion and maintained stable performance at criterion when compared to a directive Social Story (omitting Gray's sentence ratio). In addition, a contextual Social Story promoted response generalization. This finding may be related to the social-contextual justification given for the performance of the target behavior that emphasized the importance of the consistency and predictability of the place

setting (Appendix E). Thus, a utensil (i.e., napkin) not mentioned in the Social Stories was positioned consistently along with other utensils in the place setting task by all those participants, and by those participants only, who had read the contextual Social Story. These findings may suggest that the social-contextual component of Gray's Social Story composition (instrumented through her prescribed sentence ratio) is a necessary part of the intervention.

a. Model for an Experimental Component Analysis

One basic problem outlined by evaluators of Social Stories interventions (Barry & Burlew, 2004; Reynhout & Carter, 2006) is the lack of a consistent research base to enable comparisons of components of intervention packages. The 10-step approach to constructing Social Stories (Table 6; with omission of step #5, identifying additional strategies, in order to maintain the purest minimal forms of procedures for a focus on Gray's sentence ratio) applied in this study (Tarnai et al., under review) established a 'common ground' so that to permit component analysis. An individual component (i.e., Gray's sentence ratio) could be systematically manipulated while leaving other factors uniform.

Without a reliable component analysis, it is not possible to ascertain whether Gray's (1995; 2003) recommendations for using her sentence ratio in Social Stories are critical or even necessary to achieve an effect. An answer to this question was needed because Social Stories have been applied for over a decade (Barry & Burlew, 2004; Reynhout & Carter, 2006) without a common framework and without empirical research support for their relative efficacy. Given that applying Gray's sentence ratio for constructing a Social Story requires careful adherence to specific guidelines, a justification was needed for the additional work that such adherence entails. This study was able to deliver empirical support for using Gray's recommended sentence ratio in Social Stories.

b. The Text of a Social Story – Social Elaboration through Gray's Sentence Ratio

1. Extending the research base. Gray's (1995, 2003) intuitive recommendations for a social-contextual framework to mere task-analytical instruction of a target skill do parallel

research findings in the literature. Scott et al. (2000) suggest that social communication training for individuals with autism should involve instruction on 'who to ask' and 'when to ask' beyond the technique of asking a question, that is, 'what words to use' (pp. 257). Rowe (1999) introduced the theoretical concept of shared schemata or background knowledge suggesting that a scaffold of understanding for a schema (i.e., mental representation) be constructed for an individual with ASD who does not yet possess it.

For a practical example, Morgenstern and Morgenstern-Colón (2002) outlined organization questions for young teens to ask themselves before arranging their study space, such as what is and is not working for them in the current arrangement, what are the most important items to be kept accessible, what is the benefit of organizing the area, and what are problems that caused disorganization in the past. After such (contextual) organizing questions, a plan and task analysis for re-arranging their study space could be developed. Myles (2005) gives further examples of organizational strategies for youth with ASD in three steps before they get to an actual task: (1) analyze the current situation; (2) strategize the task at-hand; and then (3) attack with a plan (pp. 32).

Theory of mind (ToM) refers to taking another person's conceptual perspective and attributing beliefs, desires, intentions, and emotions (Baron-Cohen, 1995). Mind-blindness, or deficits of ToM, makes it difficult for individuals with ASD to recognize relevant cues in the not-explicitly-taught 'hidden curriculum' of the social environment (Myles, 2005). Myles (2005) theorized that Social Stories may help individuals with ASD map out relevant cues and understand contexts of behavior. Along this line of thought, added social-contextual information may aid instruction for similar reasons to what Bandura (1974; 1977) and colleagues (Bandura & Huston, 1961; Bandura, Adams, & Beyer, 1977) outlined in their social learning theory.

Part of a child's socialization takes place through direct training, but much of a child's behavior repertoire is believed to be acquired through identification with important adults in his life, termed vicarious/observational learning (Bandura & Huston, 1961), which is more a result of

active model imitation by the child of attitudes and patterns of behavior, not directly attempted to be taught. According to Bandura (1977), acquisition of broad response information is a major aspect of learning. Much human behavior is developed through modeling when one forms a conception of how new behavior patterns are performed, and the abstract symbolic construction serves as a guide for action (Bandura, 1977). Thus, motivation, which is primarily concerned with activation and persistence of behavior, is partly rooted in cognitive activities (Bandura, 1977). Bandura (1974) advocates for a shift from managing conduct to developing skills in self-regulation. Situational supports (Bandura et al., 1977) will play an important role in enhancing motivation for performance: expectations of personal efficacy determine whether behaviors will be initiated, how much effort will be expended, and how long it would be sustained in the face of obstacles (Bandura, 1977). The more dependable the experiential sources (i.e., modeling and situational supports; or explicit, written social-contextual information in the jargon of Social Stories), the greater are the changes in perceived self-efficacy (Bandura et al., 1977).

Emotional arousal and stress can affect perceived self-efficacy and motivation for performance as well (Bandura, 1977). Because high arousal usually debilitates performance, individuals are apt to consider themselves more able when they are not beset by aversive arousal than when they are tense and viscerally agitated (Bandura et al., 1977). Achieving reductions in fear, presented symbolically (situational circumstances in which behavioral attainments occur) impede change in self-efficacy (Bandura, 1977). Mapping out environmental cues and contexts of target behavior performance through Social Stories may serve as a means of reducing fear of the unknown and resistance to change of routines, thus, easing a characteristic burden to initiating (social) behaviors by individuals with ASD (APA, 1996).

Khemka (2000) and Khemka et al. (2005) found in empirical studies that a decision-making training approach for students with cognitive disabilities, which addressed both cognitive (i.e., knowledge of facts) and motivational (i.e., personal and community values; goal-awareness and goal-directedness) was superior to a cognitive-only training approach. Their findings parallel

Gray's experience-based, but not evidence-supported, intuitive suggestions (1995; 2003) for adding broader, social-contextual information to a Social Story; which she intended to ensure through the vehicle of a ratio of specific sentence types in a Social Story (Table 2).

The present study replicated Khemka's (2000) and Khemka et al.'s (2005) findings in the context of a Social Stories intervention package to teach table setting skills to students with ASD; and the results offer evidence-based support to using Gray's intuitively suggested sentence ratio. These outcomes expand the field's knowledge base about the efficient implementation of Social Stories and reinforce the use of broader, social-contextual information when explicitly teaching a target skill; in addition to using other evidence-based, good instructional practices.

Further, highlighting a justification for the performance of the target behavior taught, in addition to merely teaching the technical aspects necessary for successful performance, appears to possibly promote generalization across related behaviors justified by the social-contextual framework. These results on response generalization are preliminary and need to be further explored in the future. The potential of response generalization through contextual Social Stories (i.e., adhering to Gray's sentence ratio) is nonetheless a promising direction because individuals with ASD typically have difficulties to generalize the use of skills that were trained explicitly but in isolation (Batshaw, 2002).

The positive outcomes on the generalization measure cannot be considered surprising because the contextual Social Story version contained explicit information relating to the reasons for, and advantages of, performing the target skill and maintaining a predictability of the place setting. Thus, Gray's sentence ratio and sentence classification served as an operationalized tool for social elaboration of the context of target skill performance. Gray's guidelines ensured that direct instruction on social-contextual cues and backgrounds was included in the instruction, as opposed to the purely TA-guided directive Social Story version. It is not impossible that intuitive, non-planned social elaboration would occur when teaching a student perform a skill

with a TA, for instance, by answering spontaneous questions or verbally pointing out cues in the environment. However, there would be no direct and explicit safeguard for the inclusion of such information which, based on the results of the present study, appears to be useful for teaching efficiency. On the other hand, contextual Social Stories (i.e., the version Gray originally suggested) explicitly include a tool for social-contextual elaboration of target skill performance, for which Gray's sentence classification and suggested sentence ratio serve as one possible, operational means.

II. Classifying question sentences. A novel issue arose when applying Gray's sentence ratio to an emerging (contextual) Social Story. When the independent raters checked the adherence to Gray's ratio, question sentences in the text (Appendix E) presented a dilemma. Gray's classifications (Table 2) have not specifically addressed the question format. From a practical point of view, for calculating a sentence ratio, it needed to be decided whether to consider a question a type 1 (descriptive, perspective and/or affirmative) or a type 2 (directive and/or control) sentence.

Since directive and control sentences are to describe either a concrete behavioral response or a strategy to be used (Table 2), and given that a question by its nature lacks such pre-set guidance, both raters have independently coded questions as type 1 sentences, without assigning them to a specific class (i.e., descriptive, perspective and/or affirmative; Table 2) within that. However, because of the low quantity (two) of question sentences in the contextual Social Story (Appendix E), Gray's sentence ratio would remain within the acceptable range even if those two sentences were omitted from the text (ratio would change to 3.29 instead of the currently rated 3.57; acceptable range is between 2.00 – 5.00); thus, the issue did not represent a confounding one in the present study. Nonetheless, future research should address the matter.

c. Instrumentation and Implementation of Social Stories

I. Participants/Settings. Only male students (no females participated in the Agency Program sessions this summer) were selected to participate in the study. All six participants had

good literacy skills and were able to read chronologically age-appropriate grade-level material (Table 7). Social Stories are supposed to be flexible in their construction and adaptable to different reading levels, as needed by their users; but the conditions of the present implementation did not allow for testing such flexibility. However, the limited variability of participant characteristics as a potential weakness of the study is counterbalanced by the fact that the intervention was successful within a natural setting and with an intact group, with typical student deficits in social interaction and routinely addressing social skills training; which supports the practical utility of the intervention for practitioners in real-life implementations.

II. Target behavior. Individual snack servers and other assigned jobs were a routine part of Agency Program sessions (e.g., distributing paper plates or cups, wiping tables clean, checking floor for waste, etc.). For the present study, the selected target behavior of table setting was preliminarily judged by Agency staff as age appropriate for this group of 9-13 years of age to perform. In the course of the intervention, social validity was checked and verified by staff ratings on the acceptability of goals (average score was 4.40 on a 1–5 Likert-type scale; see Table 8).

Two ways of assessing social validity (Bailey & Burch, 2002) are social comparisons of the procedures used with a student to naturally occurring, typical routines for the student's peers (e.g., the way how students greet a teacher when passing him/her in the hallway); and expert opinions solicited from persons knowledgeable about a factor of interest (e.g., a therapeutic recreation counselor's observation data about how local teenagers spend their leisure time). For the present study, the validity of target behavior selection was based both on the experience of Agency Program staff with children with and without disabilities of different age groups; and on consultation of professional culinary service recommendations about a given table setting format (Ridges & Curtis, 2004).

As emphasized earlier, reviewers of Social Story literature (Barry & Burlew, 2004; Reinhout & Carter, 2006; Sanosti et al., 2004; Tarnai et al., under review) reported that

behavioral targets included both aims to decrease socially disruptive or challenging behaviors (e.g., using loud voice, dropping to floor for tantrum, spilling food/drink) and to increase social interaction or communicative behaviors (e.g., napkin use, sharing toys, greeting). The authors cited above found that targeted behaviors were broadly interpreted as social skills, not limited in nature, but had in common that they had to either be displayed more often, or they had to be avoided, within a given social context in order for the participants' conduct to be regarded as (socially) appropriate. Similarly, table setting itself can be performed in isolation, but the task practiced at the Agency Program was routinely a social one, setting up for peers and then sharing a snack together. Thus, the (contextual) Social Story emphasized the advantages of setting up for others in a certain (consistent/predictable) way (Appendix E).

Many behaviors could be set in a social context and thus, be applicable for a Social Story. Technically, even a non-social skill (e.g., multiplication in math) could be task-analyzed and presented in a Social Story format. However, it is questionable if instruction in such an isolated academic skill would actually be more confusing when presented along with (probably unnecessary) contextual information instead of in an explicit, 'pure' task analysis. A Social Story format would make more sense if not the performance of an academic skill itself was of concern, but rather the social circumstances surrounding academic work. Such socially relevant skills could include examples of how to ask for help, when to begin individual work, what noise levels are appropriate during individual practice, and what to do after one is finished with the task at-hand.

The principal investigator and Agency Program staff have judged the Agency Program's snack-time table setting routine as appropriate to be targeted with the present Social Stories project (Table 8). Table setting as a technical skill does not necessarily have a social aspect in itself, but at the Agency Program, students were expected to set tables for their peers and the whole snack time was regarded as an opportunity to socialize. Thus, the performance of the

table setting skill was embedded in a social context and it was emphasized that each student, on a rotating basis, be of service to their peers by performing this target behavior.

III. Dependent measures. Student performance was measured in the present study primarily on (a) criterion level (criterion = 100% of the task-analyzed skill steps [Appendix C] performed appropriately); and (b) the number of trials-to-criterion (reaching a consistent / continuous performance of 100% of the task-analyzed skill steps). These dependent measures were practical measures of teaching efficiency.

As previous research (Barry & Burlew, 2004; Bledose et al., 2003; Brownell, 2002; Hagiwara & Myles, 1999; Kuoch & Mirenda, 2003; Kuttler et al., 1998; Lorimer et al., 2002; Reynhout & Carter, 2006; Scattone et al., 2002, 2006; Scott et al., 2000; Swaggart et al., 1995) showed, both Social Stories, and other 'good practice' components of intervention packages are potentially effective. Thus, demonstrating superior teaching efficiency carries pragmatic significance and justifies the effort of carefully constructing a personalized Social Story adhering to Gray's guidelines (specifically, her sentence ratio).

In this study, a contextual Social Story (adhering to Gray's sentence ratio) yielded fewer trials to criterion and maintained stable performance at criterion, in comparison to a directive Social Story (omitting Gray's sentence ratio). The outcomes on teaching efficiency measures were able to deliver empirical support and justification for using Gray's sentence ratio in Social Stories.

In addition to these primary dependent measures, (c) the placement of the napkin – even though not included in the Social Stories (Appendix C; D; E) – was recorded for all six participants for exploring the possibility of generalization of the message of the contextual Social Story about predictability of the place setting (Appendix E). The napkin was positioned consistently in the place setting task by all those participants, and by those participants only, who had read the contextual Social Story (adhering to Gray's sentence ratio).

Based on these results, adding broader, social-contextual information to a Social Story (justifying and explaining the performance of the target behavior taught), in addition to merely teaching technical facts necessary for successful skill performance, appeared to possibly promote generalization across related behaviors justified by the same social-contextual framework (i.e., predictability of the place setting). Gray (1995; 2003) intended to ensure the adding of such social-contextual information through the use of a ratio of specific sentence types in a Social Story (Table 2); and this study has supported her proposition.

IV. Independent measures – Procedures. The independent measures in the proposed study were a contextual (i.e., including Gray's sentence ratio) and a directive (i.e., omitting Gray's sentence ratio) Social Stories intervention package. The 10-step approach (based on Tarnai et al., under review; Table 6) provided a practical scaffold for both guiding story construction and checking treatment integrity (Appendix G). Practitioners may follow these steps and be assured that their individual implementations of Social Stories adhere to empirically validated guidelines.

One possible practical advantage of Social Stories in some instructional situations may be that instruction is 'removed' from skill practice in the actual settings and from actual expected performance times. Thus, the intervention is relatively unobtrusive and requires low supervision from the instructor at actual performance times. This has proven itself to be true for the present study, as evident from the social validity ratings by staff on the ease of implementation (average score of 4.40 on a 1–5 Likert-type scale; Table 8).

The reading of the stories quickly became a routine and participants were happy to do it again and again, before Agency Program activities would start for the day. In fact, if staff was not quick enough to personally call on participants, some of them would walk up to staff themselves and ask if it was time to read their stories. Adherence to routines, which typically is a strength of students with ASD (Scott et al., 2000) renders Social Stories a well-suited intervention for this population.

Another primary strength of individuals with ASD involves visual processing (Scott et al., 2000). That is, individuals with ASD often learn and interpret information through things that are seen rather than things that are heard (Myles, 2005). Rosenshine (1997) advocated for the use of graphic organizers for improved cognitive processing (Table 5). The relative strength of visual processing can be built upon in interventions for individuals with ASD. Social Stories or scripts take advantage of strength in visual processing by supplying individuals with ASD with a written (i.e., permanent) text and are recommended for this population for this specific reason (Scott et al., 2000). Social Stories primarily are written permanent products and require intervention participants to be able to read. Adherence to Gray's (1995; 2003) specific guidelines to constructing Social Stories (e.g., implementing the prescribed sentence ratio) requires literacy.

Originally, Gray (1995) has discouraged, then (2003) allowed the story texts to be supported by graphics or pictures. However, adherence to Gray's specific guidelines to constructing Social Stories (e.g., implementing the prescribed sentence ratio) requires literacy. Texts can and should be adapted to each participant's reading abilities (Scott et al., 2000; Gray, 2003), but completely supplementing written text with graphics would result in a different kind of intervention. Even if an accompanying text (including Gray's sentence ratio) is written to graphics and is read aloud for a student, the visual-auditory modalities are rearranged in proportions. It is not possible to evaluate based on the field's current research base whether and how such a 'non-literate Social Story intervention alternative' would work efficiently.

V. Research design. A matched-pairs multiple baseline design was used; one participant of each matched pair receiving instruction through a contextual Social Story, the other one through a directive Social Story. A multiple baseline design was chosen because of its capacity to compare performance across the two Social Story versions used for instruction, and at the same time to counteract order or sequence effects that more easily emerge in multiple or alternating treatment designs. However, precautions needed to be taken because of possible

carry-over effects through the matched participants' looking at and copying each other's behaviors, which could have represented a serious confounding factor.

The applied procedures of positioning the matched participants in space so they would face opposite walls while working on their target task, and occasionally reminding participants that their stories they'd read may contain personalized instructions meant just for them, did result in no obvious carry-over effects observed neither in baseline nor in intervention performance. Such measures may not be sufficient, or not practical to implement, in a different setting or with a different target skill and/or with participants with characteristics different from those in this study; in order to counteract copying behaviors resulting in carry-over effects. Therefore, it is always advisable to check for possible carry-over effects during baseline and modify procedures until stable and distinct baseline performances are demonstrated, before proceeding to intervention; in order to ensure independent performance and learning within a framework of individually operating contingencies/reinforcement histories.

Implementations of Social Stories interventions are typically relatively short, spanning over 4-19 days of treatment, as reported in the literature review by Tarnai et al. (under review) (see Table 3). In the present study, three baseline sessions and four intervention sessions were run with each participant, adding up to seven sessions per participant. This duration is similar to other studies involving Social Stories, and the treatment manifested clear effects within this time period (Figures 2; 3). However, for clinical significance, future replication studies should examine longer implementation periods to demonstrate clear practical advantages on teaching efficiency.

d. Limitations of the Study

A limitation to the generalizability of the results of this study is inherent by the fact that the intervention has been implemented with limited variability in participant characteristics. Only male students (no females participated in the Agency Program sessions this summer) were selected to participate; and all six participants had good literacy skills and were able to read chronologically age-appropriate grade-level material (Table 7). Social Stories are meant to be

flexible in their construction and adaptable to different functioning levels as needed; yet the actual conditions of the present implementation did not allow for testing such flexibility. On the other hand, the intervention has been successful within a natural setting (agency-based social skills training) and with an intact group of students, which supports the practical utility of the intervention for practitioners in real-life implementations.

Social Story construction guidelines – specifically, sentence typology – need to be revised in light of the dilemma presented by question sentences. Gray's classifications (Table 2) have not specifically addressed the question format. From a practical point of view, Gray's sentence ratio would remain within the acceptable range for the contextual Social Story used in the present study (Appendix E), even if the two question sentences were omitted from the text (ratio would change to 3.29 instead of the currently rated 3.57; acceptable range is between 2.00 – 5.00). However, simply omitting questions from Social Stories does not deliver an empirical answer to issues raised by them relating to sentence typology, sentence ratio calculation, and practical (in)significance of their use in Social Stories. The present study did not analyze the role of question sentences in Social Stories.

For the purposes of this study, no additional strategies (step #5 of the 10-step approach; Table 6) were used to support learning of the target behavior beyond a basic model intervention package (in order to allow a focus on the component analysis addressing Gray's sentence ratio). Nevertheless, in situations where clinical utility played more important a role than research rigor, target behaviors might be addressed even more effectively with added strategies/materials known as good instructional practices (and reported as being used jointly with Social Stories in some empirical studies, e.g., Barry & Burlew, 2004; Reynhout & Carter, 2006). Such additional strategies/materials may include contrived reinforcement schedules, functional communication training, additional pictures or graphic organizers (Barry & Burlew, 2004; Reynhout & Carter, 2006; Tarnai & Wolfe, 2008). The present study did not intend, and was not able, to put such factors in a perspective of treatment efficiency.

e. Future Research Directions

Social Stories draw on a visual strength that many individuals with ASD typically may have, and offer a structured, tangible organization of social concepts that many individuals with ASD typically may need. In spite of these intuitively promising characteristics, researchers (Barry & Burlew, 2004; Reynhout & Carter, 2006) have identified incongruences in implementation and effects of reviewed Social Stories interventions.

Reynhout and Carter (2006) called for a better analysis of components and the practical implementation of Social Stories intervention packages, and they have invited prospective research to determine if a particular variation of Social Story implementations yielded more effective outcomes than others; in order to support the work of practitioners with an empirical evidence base. The present study initiated a component analysis of a literature-based model intervention package (Table 6) addressing the practical utility of applying Gray's sentence ratio. Results have supported the efficiency of Gray's ratio within the given framework; yet, some open questions still remain.

The limited variability in participant characteristics did not allow for testing the flexibility of Social Stories in their construction in terms of being adaptable to different student functioning levels as needed. It would be useful to follow-up on the positive outcomes and explore if the same results would hold for different participants and/or in different settings than the ones tested in this study.

In addition, sentence typology needs to be revised as applying to question sentences. Gray's original sentence typology (Table 2) did not take in account a question structure. For calculating a sentence ratio for the contextual Social Story (Appendix E) used in the present study, both raters have independently coded the two questions within the text as type 1 sentences (i.e., descriptive, perspective or affirmative); because type 2 (directive or control) sentences describe either a concrete behavioral response or a strategy to be used (Table 2), and a question by its nature lacks such pre-set guidance. It needs to be examined whether

questions could be assigned to an already existing type 1 class or if a new category needs to be defined for accurate sentence ratio calculation. At this point, it is not known what practical difference, and if an (in)significant one, the use of question formats make in Social Stories.

Further, for the purposes of this study, no additional strategies (step 5 of the 10-step approach; Table 6) were used to support learning of the target behaviors, in order to allow a focus on the basic component analysis addressing Gray's sentence ratio. However, when clinical utility takes priority before research rigor in a practical implementation, it would be useful to know, and be able to reach to, an established supplementary toolbox identifying strategies and materials that can be adapted for a Social Stories intervention package and that might address certain target behaviors even more effectively; such as contrived reinforcement schedules, functional communication training, additional pictures or graphic organizers, etc. This study was not geared to putting such factors in a perspective regarding treatment efficiency, but prospective research should address the issue in order to support the work of practitioners.

f. Implications for Researchers and Practitioners

The application of empirically validated, good instructional practices as components of Social Stories intervention packages (Yarnall, 2000; Elder, 2002; Reynhout & Carter, 2006; Tarnai & Wolfe, 2008), as well as building on visual and routine-adherence strengths (Scott et al., 2000) renders Social Stories a well-suited intervention for individuals with ASD. For best outcomes when implementing Social Stories in clinical practice or in research, some implications should be considered.

Previous research (Barry & Burlew, 2004; Reynhout & Carter, 2006; Tarnai et al., under review) has revealed inconsistencies in the construction of Social Stories intervention packages, in the structure of the text of a Social Story itself, and/or in treatment integrity. Thus, it is imperative for empirical research to identify a well-defined intervention before proceeding to implementations. Intervention components and procedures should be (a) operationally described, and (b) interventions need to adhere to projected procedures in order to achieve

treatment integrity. Meaningful conclusions can only be drawn from research that consistently applies clearly defined procedures. Further, (c) researchers should manipulate only one intervention component at a time to evaluate its relative contribution to treatment effectiveness. If intervention components in addition to the text of a Social Story are used (e.g., manipulated reinforcement schedules, graphics or photographs to enhance the story text), these should not be varied at the same time as components of story/text construction. A system such as the 10-step approach (based on Tarnai et al., under review; Table 6) may provide a practical scaffold for both guiding Social Story construction and for checking treatment integrity. In addition, (d) if generalizability of findings is of major concern, and if an intervention is being implemented with participants of different characteristics, or in varied settings, then such implementation variations should be carried out with a consistent intervention package that does not vary intervention components at the same time as other implementation factors (e.g., settings) are being varied.

Practitioners (e.g., teachers, therapists, parents) should also pay attention to (1) being consistent when using Social Stories. When they plan an intervention, (2) components and procedures should be selected from empirically based sources. For example, when following the 10-step approach (Tarnai et al., under review), practitioners may be assured that their individual implementations of Social Stories adhere to empirically validated guidelines. Supported by the field's current knowledge base, (3) practitioners should select literate individuals as ideal candidates for participation in Social Stories interventions; keeping in mind that the reading level of a story may be adjusted to personal needs; and comprehension needs to be (re-)checked. For behavioral objectives, (4) target skills should be selected that involve performance embedded within a social context. Careful adherence to (5) the sentence types and ratio prescribed by Gray (2003; Table 2) will guide social elaboration and help meaningfully highlight social-contextual cues and rules of the 'hidden curriculum' (Myles, 2005) that can provide assistance to an individual with ASD in the form of a well-constructed Social Story. To make target skill performance more natural and less dependent on contrived tools and strategies, (6) the text of a

Social Story should gradually be faded out as students become more skillful; and (7) skill performance should be practiced in varied environments for generalization. Following the above guidelines may ensure optimal outcomes and maximize the potential of Social Stories as an instructional strategy and as a research tool or research target.

g. Conclusions

Social Stories incorporate instructional tools that are empirically based good practices in special education. The literature reported incongruences in implementation and respective effects of Social Stories; therefore, there was a need to clarify and analyze a model intervention package.

The present study sought to establish the relative importance of applying Gray's sentence ratio as a component in a Social Stories intervention package teaching table setting skills to students with ASD. Results suggest that when leaving other intervention components constant in a 10-step approach to constructing and implementing Social Stories (Tarnai et al., under review), a contextual Social Story (adhering to Gray's sentence ratio) yielded fewer trials to criterion and maintained stable performance at criterion when compared to a directive Social Story (omitting Gray's sentence ratio) in a table setting task. In addition, a contextual Social Story promoted generalization of the social-contextual justification for the performance of the target behavior; thus, a utensil (i.e., napkin) not mentioned in the Social Stories was positioned consistently by all those participants, and by those participants only, who had read the contextual Social Story.

The study was able to deliver empirical support for using Gray's sentence ratio in Social Stories, justifying the effort that the adherence to the ratio requires when constructing a story. Such empirical support was needed because inconsistent forms of Social Stories have been used for over a decade (Barry & Burlew, 2004; Reynhout & Carter, 2006) without a common framework and without empirical evidence for their components' relative efficacy.

However, Gray's sentence ratio is certainly not the only effective component in a Social Stories intervention package. Reynhout and Carter (2006) argue that there may be other elements within such intervention packages, for instance reinforcement and explicit teaching that has much effect on students. Other research-based 'good practices' of effective instruction should not be neglected when planning interventions for individuals with ASD. Just as Quill (1995) recommends, "reading a social story may be listed as a 'first step' of a positive behavioral plan or intervention, followed by a sequence of additional steps to assist the child in learning a new social skill" (p. 229).

The present intervention was successful within a natural setting and with an intact group, which supports its practical utility for real-life implementations. Furthermore, the intervention was non-intrusive as supported by social validity data. It may well be a practical advantage of Social Stories in some instructional situations that instruction itself is 'removed' from skill practice and from actual expected performance times; consequently, requiring low performance guidance and supervision from the instructor at actual performance times.

Further research is needed to refine Social Story construction for different student populations with varying characteristics; to elaborate the use of question sentences within Gray's basic typology; and towards an advanced component analysis to establish the relative efficacy of supplementary strategies and/or materials within a Social Stories intervention package. With further component variables validated empirically, Social Stories, applying Gray's sentence ratio, have the potential to become a powerful, research-based instructional strategy.

References

- Alberto, P. A., & Troutman, A. C. (2008). *Applied behavior analysis for teachers* (8th ed.). Upper Saddle River, NJ: Prentice Hall.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: APA.
- American Psychiatric Association. (1996). *Diagnostic and statistical manual of mental disorders* (4th ed.; text revision). Washington, DC: APA.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.
- Baron-Cohen, S. (2005). Autism--"autos": Literally, a total focus on the self? In T. E. Feinberg, & J. P. Keenan (Eds.), *The lost self: Pathologies of the brain and identity*. (pp. 166-180). New York, NY, US: Oxford University Press.
- Bailey, J. S., & Burch, M. R. (2002). *Research methods in applied behavior analysis*. Thousand Oaks, CA: Sage Publications.
- Bandura, A. (1974). Behavior theory and the models of man. *American Psychologist*, *n.d.*, 859-869.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215.
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology*, *35*, 125-139.
- Bandura, A., & Huston, A. (1961). Identification as a process of incidental learning. *Journal of Abnormal and Social Psychology*, *63*, 311-318.
- Barry, L. M., & Burlew, S. B. (2004). Using social stories to teach choice and play skills to children with autism. *Focus on Autism and Other Developmental Disabilities*, *19*, 45-51.
- Batshaw, M. L. (2002). *Children with disabilities*. Baltimore, MD: Brookes.

- Bernstein, D., & Tiegernan-Farber, E. (2002). *Language and communication disorders in children* (5th ed.). Boston, MA: Allyn & Bacon.
- Bernstein, G. S. (1989). In response: Social validity and the report of the ABA task force on right to effective treatment. *The Behavior Analyst*, 12(1), 97.
- Bledose, R., Myles, B. S., & Simpson, R. L. (2003). Use of a Social Story™ intervention to improve mealtime skills of an adolescent with Asperger syndrome. *Autism*, 7, 289-295.
- Brophy, J. (1986). Teacher influences on student achievement. *American Psychologist*, 41, 1069-1077.
- Brophy, J., & Good, T. L. (1986). Teacher behavior and student achievement. In M. C. Whittrock (Ed.), *Handbook of research on teaching* (3rd ed.) (pp. 328-375). Aera.
- Brown, F., & Snell, M. E. (2005). Meaningful assessment. In M. E. Snell & F. Brown, *Instruction of students with severe disabilities* (6th ed.) (pp. 67-114). Upper Saddle River, NJ: Merrill.
- Brownell, M. D. (2002). Musically adapted social stories to modify behaviors in students with autism: Four case studies. *Journal of Music Therapy*, 39, 117-144.
- Campbell D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Chicago, IL: Rand-McNally.
- Chadsey-Rusch, J. (1992). Toward defining and measuring social skills in employment settings. *American Journal on Mental Retardation*, 96, 405-418.
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2006). *Applied behavior analysis* (2nd ed.). Columbus, OH: Merrill.
- Elbaum, B., Vaughn, S., Hughes, M., & Moody, S. W. (1999). Grouping practices and reading outcomes for students with disabilities. *Exceptional Children*, 65, 399-415.
- Elder, J. H. (2002). Current treatment in autism: Examining scientific evidence and clinical implications. *Journal of Neuroscience Nursing*, 34(2), 28-40.
- Ellis, A. K. (2001). *Research on educational innovations* (3rd ed.). Larchmont, NY: Eye on Education.

- Ellis, E. S., Worthington, L. A., & Larkin, M. J. (1994). *Effective teaching principles and the design of quality tools for educators: Executive summary*. A commission paper written for the NCITE, The University of Oregon.
- Garfield J., Peterson C., & Perry T. (2001). Social cognition, language acquisition and the development of the theory of mind. *Mind & Language*, 16(5), 494–541.
- Good, R. H., & Kaminski, R. A. (2007). *Dynamic indicators of basic early literacy skills: DIBELS benchmark goals and indicators of risk* (6th ed.). Eugene, OR: Institute for the Development of Educational Achievement. Retrieved June 23, 2008, from <http://www.dibels/uoregon.edu>.
- Gray, C. A. (1995). Teaching children with autism to "read" social situations. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 219-241). Albany, NY: Delmar.
- Gray, C. A. (2003). *Social Stories*. Retrieved April 13, 2003, from <http://www.thegraycenter.org>.
- Gray, C., & White, A. L. (2002). *My social stories book*. London, UK and Philadelphia, PA: Jessica Kingsley Publishers.
- Greenway C. (2000). Autism and Asperger syndrome: Strategies to promote prosocial behaviours. *Educational Psychology in Practice*, 16, 469–486.
- Hagiwara, T., & Myles, B. S. (1999). A multimedia Social Story™ intervention: Teaching skills to children with autism. *Focus on Autism and Other Developmental Disabilities*, 14, 82-95.
- Happe F. G. E. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development*, 66, 843–855.
- Haring, T., & Breen, C. (1992). A peer-mediated social network intervention to enhance the social integration of persons with moderate and severe disabilities. *JABA*, 25, 319-333.
- Kazdin, A. E. (1982). *Single-case research designs*. New York: Oxford University Press.

- Khemka, I. (2000). Increasing independent decision-making skills of women with mental retardation in simulated interpersonal situations of abuse. *American Journal on Mental Retardation, 105*(5), 387-401.
- Khemka, I., Hickson, L., & Reynolds, G. (2005). Evaluation of a decision-making curriculum designed to empower women with mental retardation to resist abuse. *American Journal on Mental Retardation, 110*(3), 193-204.
- Kuoch, H., & Miranda, P. (2003). Social Story™ interventions for young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 18*, 219-227.
- Kuttler, L., Myles, B. S., & Carlson, J. K. (1998). The use of social stories to reduce precursors to tantrum behavior in a student with autism. *Focus on Autistic Behavior, 13*, 176-182.
- Lorimer, P. A., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2002). The use of social stories as a preventative behavioral intervention in a home setting with a child with autism. *Journal of Positive Behavior Interventions, 4*(1), 53-60.
- Morgenstern, J., & Morgenstern-Colón, J. (2002). *Organizing from the inside out for teens: The foolproof system for organizing your room, your time, and your life*. New York, NY: Henry Holt.
- Myles, B. S. (2005). *Children and youth with Asperger syndrome: Strategies for success in inclusive settings*. Thousand Oaks, CA: Corwin Press.
- Myles B. S., & Simpson R. L. (2001). Understanding the hidden curriculum: An essential social skill for children and youth with Asperger Syndrome. *Intervention in School and Clinic, 36*, 279–286.
- Neisworth, J. T., & Wolfe, P. S. (2005). *The autism encyclopedia*. Baltimore, MD: Brookes.
- Ozonoff S., & Miller J. (1995). Teaching theory of mind: A new approach to social skills training for individuals with autism. *Journal of Autism & Developmental Disorders, 25*, 415–435.
- Public Law 108-446, *Individuals with Disabilities Education Improvement Act of 2004*, H.R. 1350, 108th Cong.

- Quill, K. A. (1995). *Teaching children with autism: Strategies to enhance communication and socialization*. New York, NY: Delmar Publishers.
- Reynhout, G., & Carter, M. (2006). Social Stories™ for children with disabilities. *Journal of Autism and Developmental Disorders*, 36, 445-469.
- Ridges, J., & Curtis, B. (2004). *A gentleman at the table: A concise, contemporary guide to table manners*. Nashville, TN: Rutledge Hill Press.
- Rosenshine, B. (1997). Advances in research on instruction. In: Lloyd, John Wills; Kameenui, Edward J.; and Chard, Kevin (Eds). *Issues in educating students with disabilities*. LEA's series on special education and disability (pp. 197-220). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Rowe C. (1999). Do social stories benefit children with autism in mainstream primary schools? *Special Education Forward Trends*, 26(1), 12-14.
- Rowland, Ch. (2004). *The communication matrix: A communication skill assessment* (3rd ed.). Portland, OR: Oregon Health Sciences University.
- Salvia, J., Ysseldyke, J. E., & Bolt, S. (2006). *Assessment in special and inclusive education* (10th ed.). Boston, MA and New York, NY: Houghton Mifflin.
- Sanosti, F. J., Powell-Smith, K. A., & Kincaid, D. (2004). A research synthesis of social story interventions for children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 19, 194-204.
- Scattone, D., Wilczynski, S. M., Edwards, R. P., & Rabian, B. (2002). Decreasing disruptive behaviors of children with autism using social stories. *Journal of Autism and Developmental Disorders*, 32, 535-543.
- Scattone, D., Tingstrom, D. H., & Wilczynski, S. M. (2006). Increasing appropriate social interactions of children with autism spectrum disorders using Social Stories™. *Focus on Autism and Other Developmental Disabilities*, 21, 211-222.

- Scott, J., Clark, C., & Brady, M. (2000). *Students with autism: Characteristics and instructional programming for special educators*. San Diego, CA: Singular.
- Scruggs, T. E., & Mastropieri, M. A. (1994). The utility of the PND statistic: A reply to Allison and Gorman. *Behaviour Research and Therapy*, 32, 879-883.
- Smith C. (2001). Using social stories to enhance behavior in children with autistic spectrum difficulties. *Educational Psychology in Practice*, 17, 337-345.
- Smith, M. D., & Philippen, L. R. (2005). *Community integration and supported employment*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Stokes, J. V., Cameron, M. J., Dorsey, M. F., & Fleming, E. (2004). Task analysis, correspondence training, and general case instruction for teaching personal hygiene skills. *Behavioral Interventions*, 19, 121-135.
- Swaggart, B. L., Gagnon, E., Bock, S. J., Earles, T. L., Quinn, C., Myles, B. S., & Simpson, R. L. (1995). Using social stories to teach social and behavioral skills to children with autism. *Focus on Autistic Behavior*, 10, 1-16.
- Swanson, H. L., & Hoskyn, M. (1998). Experimental intervention research on students with learning disabilities: A meta-analysis of treatment outcomes. *Review of Educational Research*, 68, 277-321.
- Szatmari, P., Bartolucci, G., Bremner, R., Bond, S., & Rich, S. (1989). A follow-up study of high functioning autistic children. *Journal of Autism and Developmental Disorders*, 19, 213-225.
- Tarnai, B., Wolfe, P. S., & Rusch, F. R. (under review). *Analysis of Social Stories interventions to teach social skills to students with ASD*. Manuscript prepared in partial fulfillment of the requirements of Comp2/PSU.
- Tarnai, B., & Wolfe, P. S. (2008). Using social stories for sexuality education for persons having autism / pervasive developmental disorder. *Sexuality and Disability*, 26(1), 29-36.

- Travis, L. L., & Sigman, M. (1998). Social deficits and interpersonal relationships in autism. *Mental Retardation and Developmental Disabilities Research Reviews, 4*, 65-72.
- Vaughn, S., Gersten, R., & Chard, D. J. (2000). The underlying message in LD intervention research: Findings from research syntheses. *Exceptional Children, 67*, 99-114.
- Yarnall, P. A. (2000, November/December). Current interventions in autism: A brief analysis. *Autism Society of America, 27*, 26-27.

Appendix A

Sample Communication Matrix Profile Sheet

Type of Symbol
For Levels V, VI or VII, specify types of symbols used (e.g., picture symbols, 3-dimensional symbols, manual signs, speech)

Level	Symbol	Meaning	Obtain	Social	Information
I Pre-intentional Behavior 0-3 mo.	(1)	Expresses Discomfort	(1)	(1)	(1)
	(2)	Protects	(2)	(2)	(2)
	(3)	Refuses, Rejects	(3)	(3)	(3)
II Intentional Behavior 3-8 mo.	(1)	Expresses Comfort	(4)	(4)	(4)
	(2)	Obtains More of Something	(5)	(5)	(5)
	(3)	Refuses, Rejects	(6)	(6)	(6)
III Unconventional Communication 6-12 mo.	(1)	Expresses Comfort	(7)	(7)	(7)
	(2)	Obtains More of Something	(8)	(8)	(8)
	(3)	Refuses, Rejects	(9)	(9)	(9)
IV Conventional Communication 12-18 mo.	(1)	Expresses Comfort	(10)	(10)	(10)
	(2)	Obtains More of Something	(11)	(11)	(11)
	(3)	Refuses, Rejects	(12)	(12)	(12)
V Concrete Symbols 12-24 mo.	(1)	Expresses Comfort	(13)	(13)	(13)
	(2)	Obtains More of Something	(14)	(14)	(14)
	(3)	Refuses, Rejects	(15)	(15)	(15)
VI Abstract Symbols 18-26 mo.	(1)	Expresses Comfort	(16)	(16)	(16)
	(2)	Obtains More of Something	(17)	(17)	(17)
	(3)	Refuses, Rejects	(18)	(18)	(18)
VII Language 24 mo. +	(1)	Expresses Comfort	(19)	(19)	(19)
	(2)	Obtains More of Something	(20)	(20)	(20)
	(3)	Refuses, Rejects	(21)	(21)	(21)

COMMUNICATION MATRIX PROFILE
Charity Rowland, Ph.D.
©1990, 1996, 2004

Oregon Health Sciences University
503.228.2300
www.ohsu.edu

Note. Adapted from Rowland, Ch. (2004). *The communication matrix: A communication skill assessment* (3rd ed.). Portland, OR: Oregon Health Sciences University.

Appendix B

DIBELS Benchmark Goals and Indicators of Risk: Second Grade

DIBELS Benchmark Goals and Indicators of Risk Three Assessment Periods Per Year						
DIBELS Measure	Beginning of Year Month 1 - 3		Middle of Year Month 4 - 6		End of Year Month 7 - 10	
	Scores	Status	Scores	Status	Scores	Status
DIBELS Nonsense Word Fluency	NWF < 30 30 ≤ NWF < 50 NWF ≥ 50	Deficit Emerging Established				
DIBELS Oral Reading Fluency	ORF < 26 26 ≤ ORF < 44 ORF ≥ 44	At risk Some risk Low risk	ORF < 52 52 ≤ ORF < 68 ORF ≥ 68	At risk Some risk Low risk	ORF < 70 70 ≤ ORF < 90 ORF ≥ 90	At risk Some risk Low risk
Third Grade						
DIBELS Measure	Beginning of Year Month 1 - 3		Middle of Year Month 4 - 6		End of Year Month 7 - 10	
DIBELS Oral Reading Fluency	ORF < 53 53 ≤ ORF < 77 ORF ≥ 77	At risk Some risk Low risk	ORF < 67 67 ≤ ORF < 92 ORF ≥ 92	At risk Some risk Low risk	ORF < 80 80 ≤ ORF < 110 ORF ≥ 110	At risk Some risk Low risk

Note. Adapted from Good, R. H., & Kaminski, R. A. (2007). *Dynamic indicators of basic early literacy skills: DIBELS benchmark goals and indicators of risk* (6th ed.). Eugene, OR: Institute for the Development of Educational Achievement. Retrieved June 23, 2008, from <http://www.dibels/uoregon.edu>.

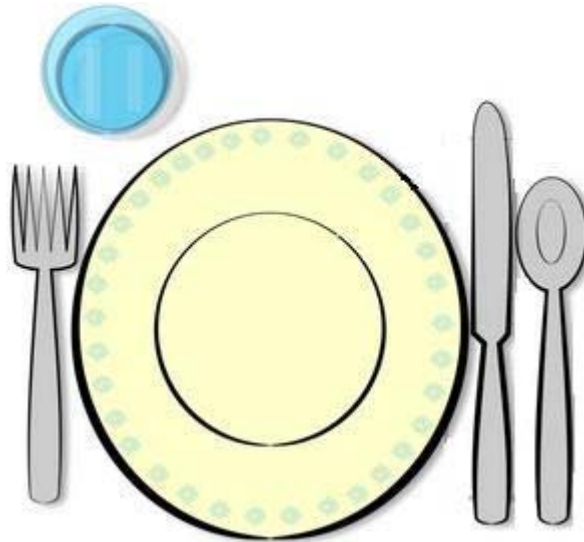
Appendix C

Task Analysis for Place Setting

How do I set the table for my friends at Agency Program at snack time?

- Place plate on the table, in front of your Agency Program friend, in the middle.
- Place fork on the left side of the plate.
- Place knife on the right side of the plate.
- Place spoon on the right side of the knife.
- Place cup on the upper left side, beyond the plate, and near the head of the fork.

The order of performing the TA steps does not count in scoring, only the end result (total correct) does (i.e., the correct layout of the dining utensils, in accordance with the graphic).



Appendix D

Place Setting Directive Social Story

How do I set the table for my friends at Agency Program at snack time?

Later today I will do the job of serving my friends at snack time. I will set the table. I will put out a plate for every kid at my table. I will also put out a fork, a knife, and a spoon for every kid at my table. I will put out a cup for every kid at my table, as well.

There is a certain way I will put these things on the table. I will set the table like this:
 I will place a plate in front of my Agency Program friend, in the middle.
 I will place a fork on the left side of the plate.
 I will place a knife on the right side of the plate.
 I will place a spoon on the right side of the knife.
 I will place a cup on the upper left side, near the head of the fork.
 This picture shows what the place setting will look like that I will do:



It does not matter in what order I put a plate, a fork, a knife, a spoon, and a cup on the table. I will repeat the same settings for each of my Agency Program friends at my table. This is how I will practice setting the table for my friends at snack time.

Comprehension Questions:

1. What job am I going to do later today at snack time?
2. Does it matter where I will put a fork for my Agency Program friends?
3. Where am I going to put a cup for my Agency Program friends?
 I will put a cup _____ (say where you are going to put it).
 I can show the cup in the picture, too (point to the cup in the picture, please).

Appendix E

Place Setting Contextual Social Story

How do I set the table for my friends at Agency Program at snack time?

It is fun to be at Agency Program! I can play games or read a book in free time. In circle time, we share interesting things that happened to us in school or at home. We also play group activities. Then I will work on a project together with the other kids.

There is the Agency Program Bank, too. I can earn dollars for a job I do well. I will sign up for a job. Later today I will do the job of serving my friends at snack time. I will set the table.

When a table is set for guests at a restaurant, or in many homes, there is a certain way this is done. This is a custom in our culture and setting a table is done in a very similar way in many homes and restaurants, and in many countries.

When people set the table for guests, they do it like this:

We place a plate in front of each person, in the middle.

We place a fork on the left side of the plate.

We place a knife on the right side of the plate.

We place a spoon on the right side of the knife.

We place a cup on the upper left side, near the head of the fork.

This picture shows what a proper place setting looks like. Have you seen this before?



Is there a reason why this place setting came to be a tradition? If people do things, like setting the table, in a similar way all the time, everybody will learn how this is done. People would find the same set-up when they go to a restaurant or to a friend's house. This way, people will not be surprised, and they will easily find everything they need at the table, right where they learned it should be. We don't have to look and search a long time to find where a spoon is. We would know exactly where to find it, on the right side of the plate, even if somebody would prefer to use their left hand to actually hold the spoon to eat with.

I think I am old enough to learn how to properly set the table when I do the job of serving my friends at snack time, here at Agency Program. I will put out a plate, a fork, a knife, a spoon, and a cup for every kid at my table. It does not matter in what order I put these on the table, but I will make sure I put them in the right place, just like in the picture. I will repeat the same setting for each of my Agency Program friends at my table.

Setting the table properly is a skill I can use in many places when I help serving my friends or family at a meal we are having together. People will notice that I can help in a grown-up way, and they will be proud of me!

Comprehension Questions:

1. What job am I going to do later today at snack time?
2. Does it matter where I will put a fork for my Agency Program friends?
3. Where am I going to put a cup for my Agency Program friends?
I will put a cup _____ (say where you are going to put it).
I can show the cup in the picture, too (point to the cup in the picture, please).

Appendix F

Personalized Social Story Books Hung up on the Agency Program Room's Wall



Appendix G

Social Story Construction and Implementation Evaluation for Treatment Integrity

Social Story construction procedures & implementation evaluation grid for treatment integrity			
Overview of the 10-Step Approach to Constructing Social Stories			
Task Steps	Strategies	Outcomes	Evaluation*
1) Identify behavior in need of change	Improvements in this behavior should likely lead to increased functional/adaptive behaviors, social functioning, or safety.	Behavior pinpointed and defined	OK
2) Identify target social skill for instruction	The social skill (alternative behavior) chosen for instruction should increase social competence (i.e., skill is functional for the student).	Target skill (alternative behavior) defined	OK
3) Collect baseline data	Observe and record the occurrence of targeted non-desirable behavior(s) and/or desired (alternative) behavior(s).	Recorded and graphed baseline data	OK
4) Create Social Story	The teacher ^b writes the Social Story: a) in the first ("I") and/or third person ("he/she/they"); b) in present or future tense; c) at the comprehension level of the student – use as much student input as possible (check comprehension after initial reading); d) label the Social Story with a title that quickly relates to the topic; e) give the story an introduction, body, and conclusion; f) state behaviors positively ("do" vs. "don't"); and g) use Gray's sentence ratio.	Personalized and formatted (a–g) Social Story ready for implementation with the student (comprehension demonstrated)	OK
5) Select additional visual cues and materials	a) Select visual cues (e.g., photos, drawings, icons, graphic/bulletheaded schedules); b) set the fading schedule and use cues accordingly.	Visual cues / schedule of use identified	N/A
6) Rehearse Social Story linked to practice of the target social skill	The Social Story should be read prior to the actual situation in which the target social skill will be used. Skill practice scenarios (settings and contingencies) should be linked to the Social Story.	Accurate story readings and skill rehearsal contingencies	OK
7) Collect performance data	Observe and record/graph performance of the desired target behavior, after the introduction of the Social Story.	Recorded and graphed intervention data	OK
8) Adapt Social Story implementation procedures, if necessary	According to changes in the targeted behavior shown by the performance data, changes in the Social Story implementation procedure (e.g., story structure or rehearsal format; skill practice scenarios) may be necessary to ensure ideal performance.	Reviewed and adapted procedures (story/routines) in place; skill is demonstrated	OK
9) Promote generalization	If stable social skill performance reaches the expected criteria in the trained practice situation, establish at least two new settings (general case programming) where the same target skill would be helpful. Adapt procedures and monitor performance.	Reviewed and adapted procedures in place; generalized target skill performance	N/A
10) Fade Social Story	Gradually and systematically fade out the Social Story (e.g., less frequent readings, gradual reduction of the story length, switching to visual cues like graphic/bulletheaded schedules as reminders, etc.).	Reviewed and adapted procedures in place; skill is maintained	N/A

Note. *This 10-Step overview form may be used to check out steps and to add comments for the evaluation of the implementation of a particular Social Story program. ^bOr another professional who will be working with the student (e.g., a teacher's aid, or a parent).

Note. Adapted from Tarnai et al. (under review). *Analysis of Social Stories interventions to teach social skills to students with ASD*. Manuscript prepared in partial fulfillment of the requirements of Comp2/PSU.

Appendix H

Tables

Table 1. <i>Diagnostic Criteria for Autistic Disorder</i>	81.
Table 2. <i>Basic Sentence Types Used in Social Stories</i>	82.
Table 3. <i>Overview of Participants, Target Behaviors, Settings, Duration and Research Design of Social Story Implementation Studies</i>	83.
Table 4. <i>Overview of Story Construction, Implementation Strategies, and Effectiveness (PND) of Social Story Implementation Studies</i>	85.
Table 5. <i>Empirically Supported Effective Instructional Components of Social Stories</i>	88.
Table 6. <i>Tarnai's 10-Step Approach to Constructing and Evaluating Social Stories</i>	90.
Table 7. <i>Overview of Participants' Demographics, and Assessment Scores Prior to Social Story Implementations</i>	92.
Table 8. <i>Social Validity Rating of Social Story Implementations by the Human Service Agency Program Staff</i>	93.

Table 1

Diagnostic Criteria for Autistic Disorder^a

(A) A total of six (or more) items from the following groups:

<u>Social Interaction (at least 2)</u>	<u>Communication (at least 1)</u>	<u>Behavior/Interests (at least 1)</u>
1. Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction	1. Delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)	1. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
2. Failure to develop peer relationships appropriate to developmental level	2. In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others	2. Apparently inflexible adherence to specific, nonfunctional routines or rituals
3. A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest)	3. Stereotyped and repetitive use of language or idiosyncratic language	3. Stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, complex whole-body movements)
4. Lack of social or emotional reciprocity	4. Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level	4. Persistent preoccupation with parts of objects

(B) Delays or abnormal functioning in at least one of the following areas with onset prior to age 3 yrs:

1. Social interaction
2. Language as used in social communication
3. Symbolic or imaginative play

(C) The disturbance is not better accounted for by Rett disorder or childhood disintegrative disorder.

Note. ^aAdapted from: American Psychiatric Association. (1996). *Diagnostic and statistical manual of mental disorders* (4th ed.; text revision). Washington, DC: APA (pp. 75).

Table 2
Basic Sentence Types Used in Social Stories

Sentence Type	Definition ^a	Example
Descriptive	Describes the social situation in terms of relevant social cues.	In the morning, when it is time for me to get up and get dressed, Mom or Dad lays out clothes for me onto the bench at the end of my bed.
Directive	Describes an appropriate behavioral response.	When I get up and out of bed, I have to take off my pajamas and put on the clothes that my Mom or Dad laid out for me.
Perspective	Describes the feelings and/or responses of the student OR others in the situation.	If I get dressed properly and in time, my parents will not be nervous and worried that I may be late for catching the school bus.
Affirmative	Expresses a commonly shared value or opinion within a given culture.	Because parents are busy in the morning with preparing breakfast for the family and getting ready for going to work, it is nice to help them by getting dressed independently and save time for them to finish their jobs.
Control	Written by a person with ASD to identify personal strategies to recall and use.	When I see Mom or Dad in the morning laying out clothes on the bench at the end of my bed for me to wear, I will get out of bed, take off my pajamas and put on those clothes.
Cooperative	Describes what others will do to assist the student.	If I need help with buttons or zippers, I can tell Mom or Dad “please help me”, show what I could not do on my own and they will help me do it.

Note. ^aDefinitions are based on the literature review by Reynhout and Carter (2006).

Table 3

Overview of Participants, Target Behaviors, Settings, Duration and Research Design of Social Story Implementation Studies

Study	Participants ^a	Target Behaviors	Setting	Duration	Research Design
Bledose et al. (2003)	1 boy, 13y, with Asperger's syndrome & ADHD (IQ=82)	Food/drink spill, napkin use	School dining area at lunchtime	7 days baseline, 5 days treatment, 5 days return to baseline, 4 days return to treatment	ABAB
Brownell (2002)	4 boys, 6-9y, with autism, verbal, at least pre-reading skills	Follow directions, using quiet voice, delayed echolalia	Classroom	5 days baseline, 5 days Social Story read, 5 days return to baseline, 5 days Social Story sung	ABAC (interventions counterbalanced across participants)
Hagiwara & Myles (1999)	3 boys, 7-9y, with autism, basic listening or written language skills	Hand washing (2 participants), on-task (1 participant)	Dining area, resource room, classroom at school	4-19 days baseline, 4-19 days treatment (depending on each behavior/participant)	Multiple baseline across settings
Kuoch & Mirenda (2003)	3 boys, 3-6y, with autism	Playing games, sharing toys, eating	Home / preschool / school; depending on each participant	7-13 days baseline(s), 5-8 days treatment(s), depending on each behavior/participant	ABA for 2 participants, ACABA for 1 participant (C = book & reminder)
Kuttler et al. (1998)	1 boy, 12y, with autism & fragile-X, vocalizations enhanced by communication book & manual signs	Inappropriate vocalizations and dropping to floor (as precursors to tantrum)	Self-contained classroom for children with autism	5 days baseline, 5 days treatment, 3 days return to baseline, 6 days return to treatment	ABAB

Lorimer et al. (2002)	1 boy, 5y, with mild to moderate autism, language skills commensurate with chronological age	Talking, waiting (interrupting vocalizations as precursors to tantrum)	Home	7 days baseline(s), 7 days Treatment(s)	ABAB
Scattone et al. (2002)	3 boys, 7-15y, with autism, capable of communicating using speech	Shouting, looking at girls, sitting on chair (no tipping)	School	4-13 days baseline, 7-16 days treatment (depending on each behavior/participant)	Multiple baseline across participants
Scattone et al. (2006)	3 boys aged 8-13y, diagnosed with ASD, intelligible speech in complete sentences	Talking to peers at playtime/lunchtime	School, natural settings of playtime or snack time (10 minutes 3X a week)	11 weeks of data collection (baseline & intervention)	Multiple baseline across participants
Swaggart et al. (1995)	1 boy with PDD, 1 boy & 1 girl with autism, 7-11y, limited expressive language	Appropriate social interactions (greeting, touching, grabbing, sharing, aggression)	School	9-51 days baseline, 9-18 days treatment (depending on each behavior/participant)	AB

Note. ^ay=years; dash indicates range, not year/months. ADHD=attention deficit hyperactivity disorder. ASD=autism spectrum disorders. PDD=pervasive developmental disorders. Adapted from Tarnai et al. (under review). *Analysis of Social Stories interventions to teach social skills to students with ASD*. Manuscript prepared in partial fulfillment of the requirements of Comp2/PSU.

Table 4

Overview of Story Construction, Implementation Strategies, and Effectiveness (PND) of Social Story Implementation Studies

Study	Case	Implementation	Comprehension check	Additional Strategies				Gray's Ratio ^a	PND
				None	Reinforcers	Prompts	Other		
Bledose et al. (2003)	Spilling / napkin use	Social Story read by researcher. Social Story accessible to student following intervention. Photos.	None	X				Yes	16
Brownell (2002)	Brian	Social Story read or sung by researcher (Story presented in traditional and in musical format).	None	X				+DIR	88
	Justin			X			Yes	90	
	Nathan			X			+DIR	80	
	Peter			X			+DIR	90	
Hagiwara & Myles (1999)	Hand washing	Social Story presented in computer based format, operated by participants. Use of visual symbols.	None			X Verbal and/or physical	+DIR (89%) & only PER (11%)	38	
Kuoch & Mirenda (2003)	Neil	Social Story read by parent (who was a teacher) in the home; and by early interventionist in the preschool/school. Use of visual symbols.	None	X				Yes	75
	Andrew			X			Yes	66	
	Henry			X			Yes	100	
Kuttler et al. (1998)	Lunchtime	Social Story read by researcher. Social Story accessible to	None			X Stickers / prize bag		+DIR	90
	Schoolwork								Yes

		student following intervention. Use of visual symbols.							
Lorimer et al. (2002)	Talking	Social Story read by parents and therapists.	None	X				Yes 43	
	Waiting	Social Story accessible to student following intervention. Use of visual symbols.		X				Yes 43	
Scattone et al. (2002)	Howard	Social Story read by teacher, teacher's aid, or student. Social Story accessible to student following intervention.	Yes		X			Yes 57	
	John					X	Verbal		Yes 92
	Kenny					X	Verbal		Yes 100
Scattone et al. (2006)	Steven	During first session, teacher read Social Story (and re-read until comprehension OK). Then, student read Social Story to teacher once a day just prior to the free-time activity.	Yes: set of predetermined questions		X			Yes 10	
	Drew					X			Yes 89
	Billy					X			Yes 69
Swaggart et al. (1995)	Greeting	Social Story read by teacher or paraprofessional. Use of visual symbols.	None					X Verbal and/or physical (for both)	
	Social play interactions				X Edibles		X Response cost sys.		+DIR (60%) Yes 0

Note. ^aGray's Ratio: 2-5 descriptive/perspective/affirmative sentences for each directive/control sentence. [+] = more of a sentence type than by Gray. DIR = directive sentences. PER = perspective sentences. PND = percentage of non-overlapping data points. Sys = system.

Adapted from Tarnai et al. (under review). *Analysis of Social Stories interventions to teach social skills to students with ASD.*

Manuscript prepared in partial fulfillment of the requirements of Comp2/PSU.

Table 5

Empirically Supported Effective Instructional Components of Social Stories

Evidence-Based Good Instructional Practices	Corresponding Components of Social Stories Interventions
<i>Explicit teaching</i> (Ellis et al., 1994; Elbaum et al., 1999; Vaughn et al., 2000)	Task analysis; modeling; cueing; comprehension check; feedback
<i>Demonstration</i> (Ellis, 2001)	
<i>Explicit instruction and drill-practice of basic skills</i> (Cooper et al., 2006; Ellis, 2001)	Task analysis;
<i>Extensive active practice</i> (Rosenshine, 1997; Swanson & Hoskyn, 1998)	Repetition/review; Practice with corrective feedback;
<i>Opportunities to learn/practice</i> (Brophy, 1986; Brophy & Good, 1986)	Fading of tangible cues; Maintenance/generalization training
<i>Guided practice with feedback</i> (Ellis, 2001)	(general case programming)
<i>Systematic feedback</i> (Rosenshine, 1997)	
<i>Small steps, and practice of each step</i> (Rosenshine, 1997; Stokes et al., 2004; Swanson & Hoskyn, 1998; Vaughn et al., 2000)	Task analysis as basis for a Social Story and its visual aids/schedules; systematic practice
<i>Organizing questions for review</i> (Elbaum et al., 1999)	Review questions for checking comprehension
<i>Graphic organizers</i> (Rosenshine, 1997)	Visual aids (words and images, schedules)
<i>Independently useable/accessible strategies</i> (Elbaum et al., 1999)	Social Story as a permanent product, and its
<i>“Plan of action” [procedural facilitators]</i> (Vaughn et al., 2000)	additional/embedded pictorial cues/schedules

Note. Based on the analysis by Tarnai, B., & Wolfe, P. S. (2008). Using social stories for sexuality education for persons having autism / pervasive developmental disorder. *Sexuality and Disability, 26*(1), 29-36.

Table 6

Tarnai's 10-Step Approach to Constructing and Evaluating Social Stories

(Based on Tarnai et al., under review.)

Task Steps	Strategies	Outcomes	Evaluation ^a
1) Identify behavior in need of change	Improvements in this behavior should likely lead to increased functional/adaptive behaviors, social functioning, or safety.	Behavior pinpointed and defined
2) Identify target social skill for instruction	The social skill (alternative behavior) chosen for instruction should increase social competence (i.e., skill is functional for the student).	Target skill (alternative behavior) defined
3) Collect baseline data	Observe and record the occurrence of targeted non-desirable behavior(s) and/or desired (alternative) behavior(s).	Recorded and graphed baseline data
4) Create Social Story	The teacher ^b writes the Social Story: <i>a</i>) in the first (“I”) and/or third person (“he/she/they”); <i>b</i>) in present or future tense; <i>c</i>) at the comprehension level of the student – use as much student input as possible (check comprehension after initial reading); <i>d</i>) label the Social Story with a title that quickly relates to the topic; <i>e</i>) give the story an introduction, body, and conclusion; <i>f</i>) state behaviors positively (“do” vs. “don’t”); and <i>g</i>) use Gray’s sentence ratio.	Personalized and formatted (<i>a–g</i>) Social Story ready for implementation with the student (comprehension demonstrated)
5) Select additional visual cues and materials	<i>a</i>) Select visual cues (e.g., photos, drawings, icons, graphic/bulleted schedules); <i>b</i>) set the fading schedule and use cues accordingly.	Visual cues / schedule of use identified

6) Rehearse Social Story linked to practice of the target social skill	The Social Story should be read prior to the actual situation in which the target social skill will be used. Skill practice scenarios (settings and contingencies) should be linked to the Social Story.	Accurate story readings and skill rehearsal contingencies
7) Collect performance data	Observe and record/graph performance of the desired target behavior, after the introduction of the Social Story.	Recorded and graphed intervention data
8) Adapt Social Story implementation procedures, if necessary	According to changes in the targeted behavior shown by the performance data, changes in the Social Story implementation procedure (e.g., story structure or rehearsal format; skill practice scenarios) may be necessary to ensure ideal performance.	Reviewed and adapted procedures (story/ routines) in place; skill is demonstrated
9) Promote generalization	If stable social skill performance reaches the expected criteria in the trained practice situation, establish at least two new settings (general case programming) where the same target skill would be helpful. Adapt procedures and monitor performance.	Reviewed and adapted procedures in place; generalized target skill performance
10) Fade Social Story	Gradually and systematically fade out the Social Story (e.g., less frequent readings, gradual reduction of the story length, switching to visual cues like graphic/bulleted schedules as reminders, etc.).	Reviewed and adapted procedures in place; skill is maintained

Note. ^aThis 10-Step overview form may be used to check out steps and to add comments for the evaluation of the implementation of a particular Social Story program. ^bOr another professional who will be working with the student (e.g., a teacher's aid, or a parent).

Table 7


Overview of Participants' Demographics, and Assessment Scores Prior to Social Story Implementations

Student	Age ^a	Diagnosis	School Type	DIBELS Oral Reading Fluency ^b	Communication Matrix Profile ^c
Matthew	10y	Autism	Attends general education classes at a public elementary school (has completed 4th grade)	ORF beyond 100 words per minute (ORF≥90 signals low risk at the second grade end-of-year level; Appendix B)	All six participants have scored Level VII (Language: Rule-bound use of symbol system. Ordered combinations of two or more symbols according to syntactic conventions.) and thus have demonstrated oral communication abilities (as opposed to alternative means of expression) in all four main categories of refuse, obtain, social, and information; and within all sub-categories (Appendix A; Level VII). The scorer (the program coordinator of the Agency Program) has pointed out that although all six participants have the ability to use language (standard American English) for communication in all tested areas, they typically (as for ASD) do not often initiate, or engage in, extensive oral communication as much as they abilities would allow.
Jonathan	11y	Autism	Attends general education classes at a public elementary school (has completed 5th grade)	ORF beyond 120 words per minute (ORF≥90 signals low risk at the second grade end-of-year level)	
Chris	10y	PDD-NOS	Attends general education classes at a parochial elementary school (has completed 4th grade)	ORF beyond 90 words per minute (ORF≥90 signals low risk at the second grade end-of-year level)	
Grant	9y	PDD-NOS	Partially attends inclusive classes at public school (has completed 3rd grade)	ORF beyond 90 words per minute (ORF≥90 signals low risk at the second grade end-of-year level)	
Jimmy	10y	PDD-NOS	Attends general education classes at a public elementary school (has completed 4th grade)	ORF beyond 110 words per minute (ORF≥90 signals low risk at the second grade end-of-year level)	
Bruce	11y	PDD-NOS	Attends general education classes at a public elementary school (has completed 5th grade)	ORF beyond 120 words per minute (ORF≥90 signals low risk at the second grade end-of-year level)	

Note. ^ay=years. ^bAssessment materials and risk evaluation based on DIBELS Benchmark Goals and Indicators of Risk; retrieved June 23, 2008, from <http://www.dibels/uoregon.edu>. ^cRowland, Ch. (2004). *The communication matrix: A communication skill assessment* (3rd ed.). Portland, OR: Oregon Health Sciences University. PDD-NOS=pervasive developmental disorder, not otherwise specified.

Table 8

Social Validity Rating of Social Story Implementations by the Human Service Agency Program Staff^a

Target Behavior	Expected Outcome	Rater	Is Goal Acceptable? ^b	Is Intervention Unobtrusive and Easy to Implement? ^{b,c}
<p>“Later today I will do the job of serving my friends at snack time. I will set the table. ... This picture shows what the place setting will look like that I will do:” (<i>quoted from Story book</i>)</p> 	<p>“Setting the table properly is a skill I can use in many places when I help serving my friends or family at a meal we are having together. People will notice that I can help in a grown-up way, and they will be proud of me!” (<i>quoted from Story book</i>)</p>	Staff #1	5	5
		Staff #2	3	4
		Staff #3	5	4
		Staff #4	4	4
		Staff #5	5	5
		TOTAL AVERAGE	4.40	4.40

Note. ^aAverage values for goal/obtrusiveness calculated with ratings obtained from five Agency Program staff members. ^b1-5 scale: 1=strongly disagree; 2=disagree somewhat; 3=indifferent; 4=agree somewhat; 5=strongly agree. ^cImplementation: reading Social Story with student, with as much active student participation as possible, once at the beginning of each Agency Program session.

Appendix I

Figures

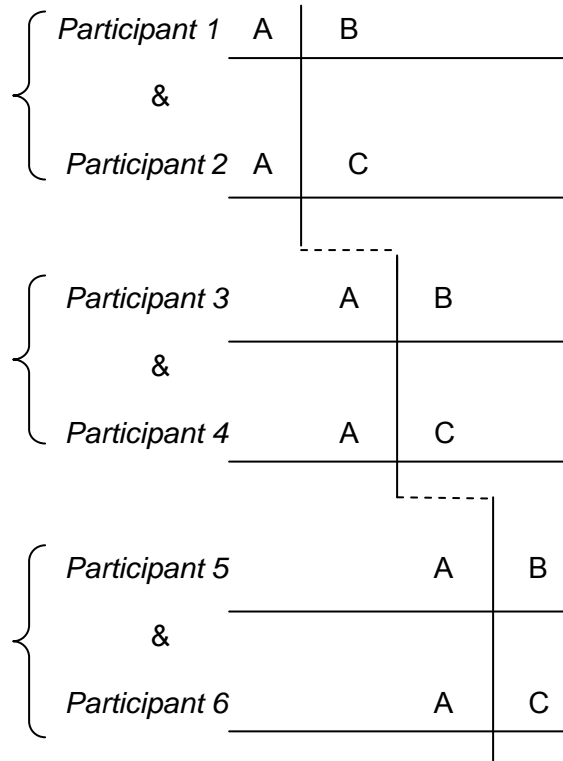
Figure 1. *Matched-Pairs Multiple Baseline Design Used for the Current Study* -----95.

Figure 2. *Performance Graphs of Social Story Interventions* -----96.

Figure 3. *Placement of Napkin and Questions Asked
About its Positioning (Not Included in Social Stories)*-----98.

Figure 1

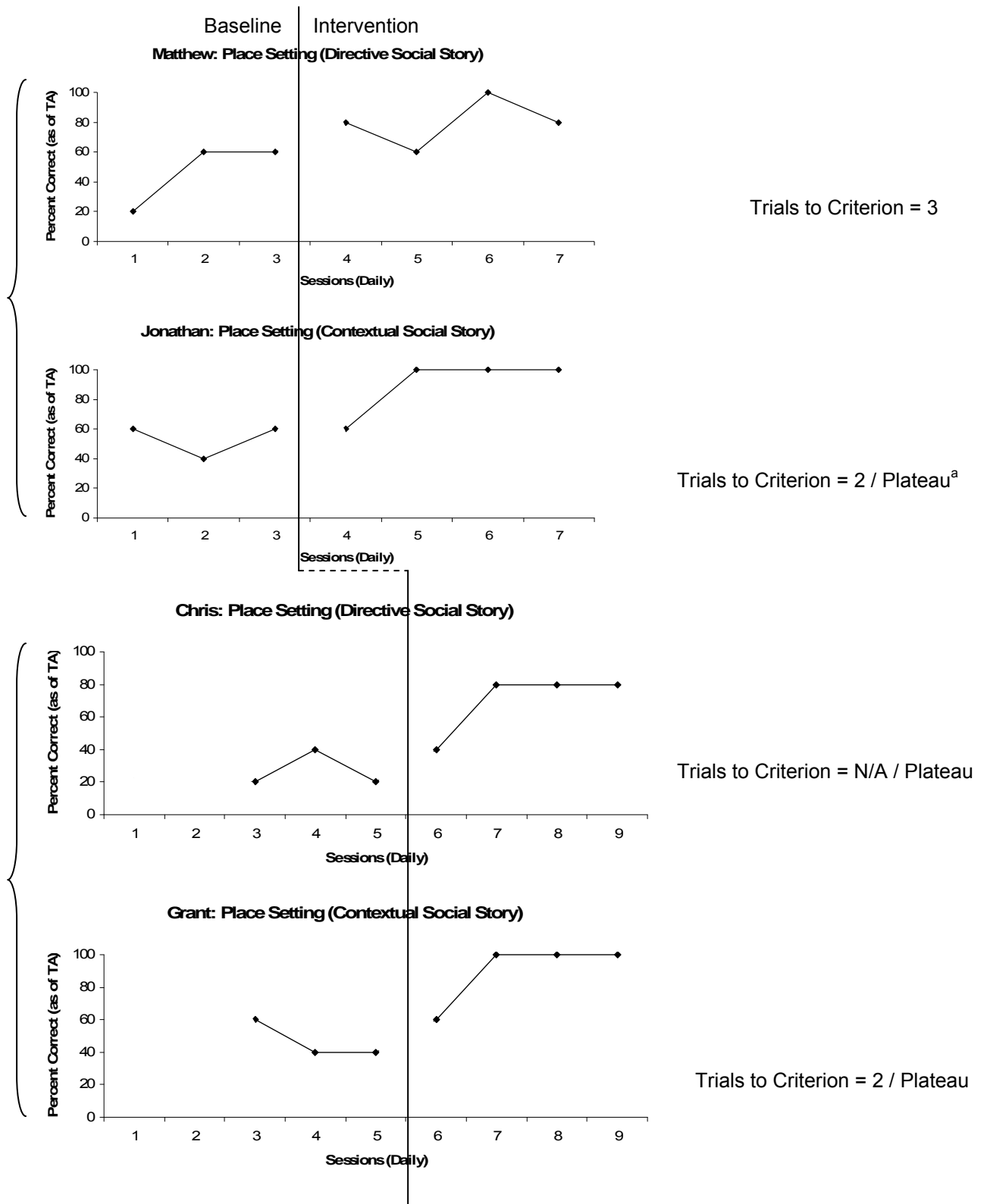
Matched-Pairs Multiple Baseline Design Used for the Current Study

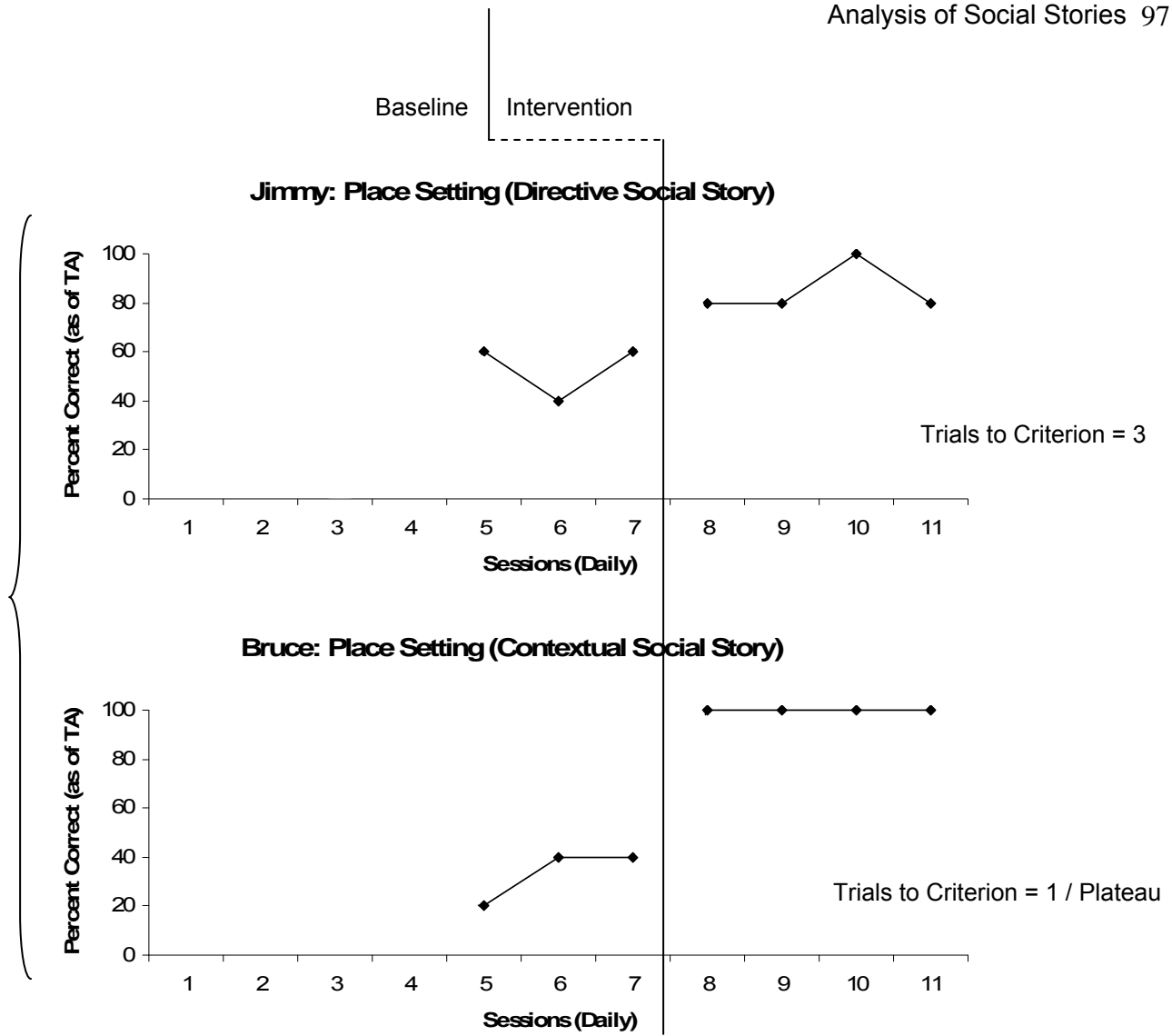


Note. A = Baseline phase. B = Instruction via contextual Social Story (i.e., including Gray's sentence ratio). C = Instruction via directive Social Story (i.e., omitting Gray's sentence ratio).

Figure 2

Performance Graphs of Social Story Interventions





Note. ^aPlateau is defined here as stable performance maintained over several sessions at a given level and not changing any more over the course of intervention for a given participant.

Figure 3

Placement of Napkin and Questions Asked About its Positioning (Not Included in Social Stories)^a

	Trials: #1 #2 #3			#4	#5	#6	#7
	Baseline			Treatment			
<u>Student (Story Type):</u>	<u>Napkin Setting^b (without Directions) and Questions Asked:</u>						
Matthew (Directive Social Story)	P	O	P	P	O	O	P
	O	P	P	P	P / "Where do these [i.e., napkins] go?"	P	P
Jonathan (Contextual Social Story)	P	R	P	P	O	P	O
	P	L;U	P	L;U / <i>right before task</i> : "Great, I knew this was gonna come 'cause I read about it this morning"; <i>during task</i> : "Shall I put the napkins under the fork?"	L;U	L;U	L;U
Chris (Directive Social Story)	P	P	O	P	O	O	P
Grant (Contextual Social Story)	P	O	P	L;U / "Where do napkins go, that was not in the story."	L;U	L;U	L;U
Jimmy (Directive Social Story)	P	P	O	P	O	O	P
Bruce (Contextual Social Story)	P	O	P	L;U / "Where do napkins go, that was not in the story."	L;U	L;U	L;U

Note. ^aThe placement of the napkin – even though not included in the Social Stories – was recorded for exploring generalization of the message of the contextual Social Story about predictability of the place setting: "Is there a reason why this place setting came to be a tradition? If people do things, like setting the table, in a similar way all the time, everybody will learn how this is done. People would find the same set-up when they go to a restaurant or to a friend's house. This way, people will not be surprised, and they will easily find everything they need at the table, right where they learned it should be". Questions raised about the placement of the napkin would be answered with the pre-coded formula: "Do as you think it would be best".

^bL=left side of plate; R=right side of plate; U=under utensil(s); P=on plate; O=over above plate.

Curriculum Vitae

I was born on midsummer's night, in the year of the US-bicentennial celebrations (6/24/76) in Hungary, Europe. There had been many (special) educators in my family, going back several generations. I went to high school in Hungary, Germany and France, and received a Master's degree in applied linguistics and one in education from ELTE Budapest in 2002. I also hold certificates in performing arts, Waldorf-education, EL and Chirophonetics therapy, as well as a Professional Development Certificate in Autism and in Applied Behavior Analysis. I have absolved the doctorate program of the Pennsylvania State University in Special Education.

My professional goals include conducting research with a focus on instructional and behavioral interventions for students at the two extreme ends of the special-needs spectrum: supporting students with mild to borderline disabilities to keep them in inclusive settings and in good academic standing; and students with severe/multiple disabilities, to enhance their independence, community involvement and social network. I was awarded the Jacob Frim Gold Medal for outstanding Public Awareness work in the field of Special Education, in Hungary, 2006; and I have received the Scholarship Award of the Robert M. Eisman Family Advised Fund for the Study of Autism, in State College, 2008.

Furthermore, I am interested in cultural traditions and how those systems can contribute to forming an individual's self-image and empowerment of his/her social and academic learning skills, personal interests and pursuits, and confidence in community involvement and initiative. Since 2006, I have been an inaugurated member, and since 2008 a Lieutenant, of the Knightly Order of Vitéz, I.C.O.C. The Order has recognized my active engagement as an ambassador of my native Hungarian culture abroad with the "Bronzkereszt" (Brass Cross) Award in 2007. I currently pursue my academic and cultural interests and endeavors as an Assistant Professor of Special Education at Seton Hill Catholic University in Greensburg, Pennsylvania.