Empirical Research Supporting *The Son-Rise Program*®

Since Autism was first outlined (Kanner, 1943), an agreed-upon definition of Autism has been reached and standardized diagnostic methods produced. To date, however, no clear etiology has been established, and proposed treatments vary widely. Research has uncovered enough about Autism's underlying neuro- and cognitive psychology to allow us to outline treatment implications to benefit those families seeking help now who are unwilling to wait for the elusive ultimate answer.

The Autism Treatment Center of America™ has been using ***The Son-Rise Program***® (***SRP***) with families since 1983 in order to fulfill this need. The ***SRP*** was developed by parents experimenting with ways to reach their severely autistic child (Kaufman, 1976). Science at this time offered no guidance on facilitating the social development of children with Autism. Since their son emerged from Autism after 3_ years of intensive work, the Kaufmans have offered ***SRP*** to families internationally. To date, no rigorous longitudinal testing of the efficacy of ***SRP*** has been performed yet it can be seen that the key principles of this approach draw support from the current research literature. This paper will discuss some key principles of ***SRP*** in the context of current research in Autism to create a platform for quantitative investigation.

Principle: Create an Optimal Physical Learning Environment

Hyperarousal to sensory input among those with Autism (Belmonte and Yurgelan-Todd, 2003 Hirstein et al, 2001; Tordjman et al, 1997) accompanied by an impairment to choose between competing stimuli is widely observed. EEG studies involving tasks requiring people with Autism to selectively attend to relevant stimuli and ignore irrelevant stimuli have shown either an abnormal heightened P1 evoked potential to the relevant stimuli or an abnormally generalized response to irrelevant stimuli (Townsend and Courchesne, 1994). Additionally, the N2 to novel stimuli is heightened in children with Autism, even when these stimuli are irrelevant to the task (Kemner et al, 1994). Similar results have been seen using auditory stimuli (Kemner et al, 1995). This supports behavioral observations that children with Autism can either be overly focused on one aspect of a task or greatly distracted by stimuli irrelevant or peripheral to the task. During tasks requiring shifts of attention between hemifields, those with Autism have been shown to exhibit both hemispheres activating indiscriminately instead of the usual hemispheric-specific patterns of activation (Belmonte, 2000). Physiological measures suggest that perceptual filtering in Autism occurs in an all-or-nothing manner with little specificity in selecting the location of the stimulus, for the behavioral-relevance of the stimulus or even the sensory modality in which the stimulus occurs (Belmonte, 2000). It has been suggested that this tendency for hyperarousal to sensory input must result from some pervasive underlying abnormality in neural processing rather than one specific brain locus (Belmonte et al, 2004; Johnson et al, 2002; Akshoomoff et al, 2002). Some authors suggest this neuronal dysfunction to be low signal-to-noise ratio developing from abnormal

neural connectivity (Bauman and Kemper, 1994; Raymond et al, 1996; Casanova and Buxhoeveden, 2002; Belmote et al, 2004).

The result of this type of processing is that all stimuli are given equal priority by the autistic brain causing an overwhelming flood of sensory information to be handled. The typical brain is able to identify and ignore irrelevant stimuli and focus valuable attention on that which is task-relevant creating a much more efficient processing system. The autistic brain, on the other hand, takes it all in and then must actively discard irrelevant information at a later processing stage causing, in effect, a processing bottleneck (Belmonte, 2004). Functional neuroimaging studies show that the brains of those with Autism tend to show increased activation in areas that rely on primary sensory processing and decreased activity in areas typically supporting higher-order processing (Ring et al, 1999; Critchley et al, 2000; Schultz et al, 2000; Pierce et al, 2001; Baron-Cohen et al, 1999; Castelii et al, 2002).

It has been proposed that this low-level processing disruption underlies the higher-level abnormalities exhibited in Autism (Belmonte, 2004) and that the widely observed symptomology of Autism (including issues of Theory of Mind and executive function) is an emergent property of abnormal neural growth (Akshoomoff, 2002). There is molecular evidence that this abnormality is present at birth (Nelson et al, 2001) even though obvious behavioral symptoms often do not typically arise until 18-24 months. A child born reliant on this over-aroused, under-selective sensory processing is open to a flood of stimuli that is thought to overload the newly emerging higher-order cognitive processes (Belmonte and Yurgelun-Todd, 2003). When faced with this processing constraint, the developing and plastic brain is forced to re-organize to accommodate that constraint (Johnson et al, 2002). This is manifested in the abnormal organization of the autistic brain as described above and the cognitive style characteristic of Autism that relies heavily on lower-order, local feature processing at the expense of higher-order, global information processing known as weak central coherence (Happe, 1999; Frith and Happe, 1994).

Central coherence describes the ability to process incoming information in context, pulling information together for higher-level meaning, often at the expense of memory for detail (Happe, 1999). Weak central coherence then is the tendency of those with Autism to rely on local feature processing (the details) rather than taking in the global nature of the situation. Kanner (1943) saw, as a universal feature of Autism, the “inability to experience wholes without full attention to the constituent parts.” It is this cognitive style that makes people with Autism superior at resisting visual illusions (Happe, 1999), have a higher occurrence of absolute pitch (Heaton et al, 1998), excel at the Embedded Figures Task (Shah and Frith, 1983; Jolliffe and Baron-Cohen, 1997) and possess the ability to copy “impossible” figures (Mottron et al, 2000).

These neurophysiological and neuroanatomical studies paint a picture of the world occupied by those with Autism as chaotic, overwhelming and filled with “noise”. Coupled with this is an internal environment of hyperarousal (Hirstein, 2001; Cohen and Johnson, 1977; Hutt and Hutt, 1979; Hutt et al, 1965; Kootz and

Cohen, 1981; Kootz et al, 1982). This is corroborated by autobiographical reports from some people with Autism (Bluestone, 2002; Williams, 1994; Gillingham, 1995; Jones et al, 2003). Considering this fragmented, chaotic and overwhelming world implies then that a child's external environment is a key and primary factor to be considered when designing a treatment program for children with Autism. Physical environments with higher amounts of sensory stimulation (e.g bright visual displays, background noise, etc.) will add to the "noise" in an already overloaded sensory system, making any new learning extremely challenging. While there is acknowledgment that children with special needs do require specifically designed environments (Carbone, 2001; Reiber and McLaaughlin, 2004; Schilling and Schwartz, 2004), the extent to which rooms can be tailored to meet the needs of these children is highly constrained by a typical classroom setting, mainly due to the presence of other children and the subsequent size of the room—even something as ubiquitous as fluorescent lighting has been shown to affect the behavior of children with Autism (Colman et al, 1976). These environmental considerations are often overlooked and their importance underestimated.

The ***SRP*** bypasses the constraint of the classroom by employing a room (usually in the child's home) that is specifically designed to lower sensory stimulation. Only neutral colors are used and distracting patterns or highly contrasting colors are avoided. There are no distracting visual displays or noises and only incandescent or natural lighting is employed. All toys and objects are kept off the floor on wall-mounted shelves to provide a distraction-free floor area for play. Most importantly, play sessions in the playroom usually include one adult and one child. This means that the child does not have to try and filter out the noise and movement of other children but deals only with a predictable adult whom s/he trusts. The ***SRP*** holds that these simple measures aid in soothing the autistic child's over-active nervous system by making the world digestible and manageable. There is evidence for a sub-set of children with Autism who do not exhibit an overactive autonomic system but instead display unusually low levels of arousal (Hirstien et al, 2001). These are the children who tend to engage in "extreme" activities (e.g. climbing very high, constantly moving, etc.) in order to "kick-start" their arousal levels. The ***SRP*** playroom provides a safe and contained environment in which to do these activities, many of which are not feasible in a typical classroom.

It can be seen that this treatment principle of ***SRP*** is supported by the current neuroanatomical and physiological data. Direct investigation of the effects on children with Autism of the ***SRP*** playroom in contrast with traditional classrooms has not yet been undertaken. Children in home-based ***Son-Rise Programs***® often instigate going into the playroom, will play in there even when they are alone and talk about how much they enjoy their special room. There is much anecdotal evidence supporting this claim but to date, no study has looked at either qualitative measures of children's perceptions of their playrooms or quantitative physiological measures of nervous system activity of children with Autism in these environments.

Principle: Create an Optimal Social Learning Environment

This weak central coherence processing style may then impede the development of joint attention and shared affect in children with Autism (Klin et al, 1992; Rogers and Pennington, 1991). These are two fundamental components of social interaction in which accurate response to stimuli depends crucially on social context. This explains why social situations are incredibly challenging for those with Autism and why even high-functioning adults who score well on explicit measures of social reasoning fail to translate this to their everyday social interactions (Klin et al, 2000).

A precursor to joint attention and shared affect is social orienting—that a child will spontaneously, or upon request, direct attention to another person. Children with Autism show social orienting impairments early in life by preferentially orienting to non-social over social stimuli. Osterling et al (2002) found 1 year olds, who were later diagnosed with ASD, looked at people and oriented to their own name less frequently than children without a subsequent diagnosis. Lack of interest in faces at 6 months (Maestro et al, 2002) and lack of orientation to the human voice at 24 months (Lord, 1995) have both been shown to be robust predictors of later ASD diagnosis. Dawson et al (2004) found that autistic children tended not to respond to a variety of stimuli more often than typical or developmentally delayed children, but that the effect was more severe in response to social stimuli. Numerous studies have shown deficits in basic visual processing of faces in Autism that were not paralleled by failures in developmentally equivalent non-social processing tasks (Langdell, 1978; Hobson et al; 1988, Klin et al, 1999; Boucher and Lewis, 1992; Weeks and Hobson, 1987). Children with Autism have been similarly shown not to respond as typical children do to the human voice (Klin, 1991, 1992; Osterling and Dawson, 1994; Werner et al, 2000).

When children and adults do orient to social stimuli they have been seen to process the information differently than their typically developing counterparts. Typically developing children show a differentiated brain event-related potential when viewing familiar and unfamiliar faces; children with Autism do not show this effect (Dawson et al, 1994). Klin et al (2003) found that autistic adults viewing a naturalistic social scene focus twice as much on the mouth region of faces than controls and 2.5 times less frequently on the eye regions than controls. Preferential looking at eyes rather than mouths has been shown in typically developing infants as young as three months (Haith et al, 1979). Typical children will show large skin conductance responses when looking at a person who looks back and much lower responses when looking at neutral objects. Children with Autism have been found to show no difference in skin conductance response whether they are looking at a person or looking at a cup (Hirstein et al., 2001).

These basic processing differences then translate into higher order reasoning and attribution-making tasks. When viewing an animation of geometric shapes acting like humans, typical viewers recognize the social nature of these interactions and provide narratives describing relationships portrayed by the shapes and attributions of mental states. Viewers with Autism tended to use physical explanations of the movement of the shapes (e.g. “because it’s heavy”)

even though these individuals had all earlier passed explicit social reasoning tasks (Heider and Simmel, 1994).

It is not clear why children with Autism avoid social stimuli. It may be due to a general impairment in attentional functioning (Bryson et al, 1994). Others believe that the rapid shifting in attention required to process social stimuli is to blame (Courchesne et al, 1995). An additional suggestion holds that children with Autism avoid social stimuli because they are complex, variable and unpredictable and are thus difficult to process (Dawson, 1991; Dawson and Lewy, 1989; Gergely and Watson, 1999).

The autistic bias towards non-social stimuli is well documented in psychology and serves as illustration for the autobiographical descriptions offered by writers with Autism (Williams, 1994; Grandin, 1986). This body of evidence shows how children with Autism selectively attend to non-social aspects of their environment—seemingly to take care of their over-active perceptual systems—and in so doing, deprive themselves of learning about the social world from an early age. Klin points out that "to impose social meaning on an array of visual stimuli is an adaptive reaction displayed by typical children, from infancy onwards, at an ever increasing level of complexity. This spontaneous skill is cultivated in countless hours of recurrent social engagement." (Klin et al, 2003, p. 356). It is widely accepted that typically developing children develop through reciprocal social interactions that involve the child's active participation (Stern, 1977; Bronfenbrenner, 1979; Piaget, 1963; Vygotsky, 1978; Bandura, 1986; Brunner, 1977; Wertsch, 1985). These theories view developmental learning to be dependent upon children's *voluntary involvement in social interaction*, not upon the specific activity or information to which children are exposed (Kim and Mahoney, 2004). It is becoming more widely recognized that this principle holds true for children with Autism (Greenspan & Wieder, 1998; MacDonald, 2004; Williams, 1988; Koegel et al, 2001) as theorists and therapists begin to develop treatment approaches that recognize the importance of voluntary social orienting and joint attention in the way ***SRP*** does.

It seems that due to their perceptual processing challenges, children with Autism are selectively avoiding this social education which negates the learning of "pivotal developmental behaviors" (i.e. attention, persistence, interest, initiation, cooperation, joint attention and affect) (Koegel, Koegel and Carter, 1999). This lack of development subsequently impacts all further learning. The development of the joint attention skill is considered essential to language, cognitive and social development in all children (Tomasello, 1995). The more time a child spends engaged with a significant adult, the more that child will learn. Children with Autism who demonstrate greater skill with joint attention have been seen to reach greater levels of language development (Mundy et al., 1990; Sigman and Ruskin, 1997; Dawson et al, 2004). Individual differences in social orienting also predict the degree to which children with Autism process non-verbal affective information (Dissanayake et al., 1996) crucial to comprehending any social situation. A 25-year follow-up of a group of 91 individuals originally showing serious social or mental challenges showed that the best predictor of outcome was social

impairment—those who were socially impaired, particularly those in the aloof category, showed a poorer outcome (Beadle-Brown, Murphy, Wing, 2005).

The implications for treatment are clear—to provide an environment that consistently and intensively favors social information and endeavors to increase the salience of the social world for children with Autism. Theoretically, the ***SRP*** fulfills the treatment implications drawn from this body of work. The ***SRP*** suggests that through hours of immersion in this type of social environment, children with Autism a) increase their frequency of spontaneous social orienting, b) maintain joint attention for longer and longer durations and c) intentionally initiate social interactions more frequently. Rigorous, empirical testing must be performed to substantiate these anecdotal observations.

This treatment implication then raises the question of *how* to provide an environment that consistently and intensively favors social information and endeavors to increase the salience of the social world for children with Autism. The ***SRP*** proposes a unique method, some key principles of which will be outlined below in the context of current research.

1) A Child-Centered Approach Makes Social Interaction Motivating

Facilitators and parents employing the ***SRP*** make social interaction their primary focus when working one-on-one with a child with Autism, recognizing that social avoidance is the crux of the autistic challenge. There are two ways in which a child-centered approach makes social interaction motivating.

a) Follow the Child: Start with the Child's Motivation

The ***SRP*** works with objects and activities for which the child is internally motivated. This play-based approach starts with the child's area of motivation (e.g. jumping on a trampoline). The adult joins in with this area of play until the child spontaneously socially orients to the adult (e.g. makes eye contact, physical contact or a vocalization attempt). This spontaneous expression of social interest from the child is then responded to by the adult in a manner designed to be motivating to the child (based on the individual child's interests and previous response patterns), for example, jumping on the trampoline while pretending to be a monkey. Any subsequent responses by the adult to the child's expressions of interest are similarly fine-tuned to be motivating to the child. Thus ensues a cycle of reciprocal social exchange within the area of the child's motivation. The ***SRP*** proposes that this approach raises the salience level of social interaction by tying the child's internal motivations to social interaction.

Autistic children can become very focused on their particular areas of motivation, often to the point of being termed "obsessional" or "perseverative". Many traditional approaches have tried to steer children away from their areas of motivation in an attempt to broaden the child's range of interest. The ***SRP*** instead recognizes these interests as doorways into that child's world, a means of forming a connection to become the foundation for more spontaneous and flexible social exchange. Support for this perspective comes from Koegel, Dyer and Bell (1987) who found a negative correlation between social avoidance and child-preferred

activities in autistic children. That is, when prompted to engage in activities the children had already demonstrated an interest in, children were much less socially avoidant than when prompted to engage in activities chosen by the adult.

Baker, Koegel and Koegel (1998) further underlined the effectiveness of the child-centered approach with autistic children in a group setting. They took the obsessional interests of a group of children with Autism (e.g. US geography) and made them into common games that could be played by the autistic child and his/her peer group (e.g. tag game on a giant map of the US). From very low levels of social interaction in the baseline condition, the percentage of social interactions increased dramatically during the intervention period and continued to be high at a 2 month follow-up. These increases in social play interactions continued even in the absence of the adult who had done the initial prompting. Furthermore, the autistic children began to engage more in other non-obsession themed games after the intervention. Baker et al (1989) conclude that "the obsessional themes of children with Autism, which are typically viewed as problematic, can be transformed successfully into common games to increase positive social play interactions" (p.306-307).

The parents of the autistic children involved in this study reported either no increase, or a decrease, in the child's engagement in the target obsessional theme at home, after the initiation of the obsessional themed games. This finding is consistent with Charlop et al (1990) who used obsessional themes as reinforcers for children to complete other tasks and found no increase in the children's use of these particular obsessional themes. The ***SRP*** similarly maintains that using a child's obsessional theme or topics of perseveration as a platform for social interaction does not encourage further perseveration but instead helps transform perseverative, rigid play or conversation into socially appropriate, flexible, reciprocal interaction, because it makes social interaction more motivating than previously. Again, direct empirical observation is required to assess these observations.

b) Give Control: Be Responsive and Sensitive to the Child

The second crucial factor in facilitating the emergence of a genuine and spontaneous interest in the social world is giving control or employing a responsive style of interaction (Beckwith and Cohen, 1992). The ***SRP*** is child-centered. This means a) the topic of play is derived from the child's individual interests, and b) the child actively chooses when to begin and end that interaction. This is critical and the juncture at which traditional approaches to special education tend to differ. Trivette (2003) defined this responsive style of interaction as involving two important components. First, the adult responds only to the child's production of a behavior. This means that the adult responds only after the child makes a physical gesture (e.g. waves, smiles, touches), a vocal sound (e.g. a coo, a word) or an action (e.g. throws a ball, picks up toy). Second, the adult's response to this action is sensitive, that is, appropriate in its level of intensity. A sensitive response is one in which the intensity level matches the child's developmental level and mood. For example, if the child is crying, the adult may offer a soothing song; if the child is excited and laughing, the adult might offer a swing in the air (Trivette, 2003).

In a meta-analysis of 13 studies looking at the effects of this style of interaction, Trivette (2003) concluded "that a responsive caregiver style of interaction positively influences the cognitive development of children with, or at risk for, developmental disabilities" and also "has a positive influence on the social-emotional development of these children" (Trivette, 2003, p.5). All 13 studies meeting inclusion criteria for this meta-analysis (1,336 children in total) showed the same result—that adult responsiveness substantially helped these children's cognitive and social-emotional development.

Subsequent research has continued to support this finding (Mahoney and Perales, 2003; Mahoney and Perales, 2005) and found that responsive interactive style also has positive outcomes on language development (MacDonald, 1989; Manolson et al, 1995). In a long-term study, Siller and Sigman (2002) found that the more mothers of children with Autism engaged in responsive interaction with their children, the higher the levels of communication functioning their children attained at 1, 10 and 12 years of age. Mahoney, Boyce, Fewell and Wheeden (1998) reported that in a large scale, multi-site early intervention research project (Infant Health and Development Program, 1990), maternal responsiveness accounted for six times more of the variance in the developmental functioning of low birth-weight children than did the children's participation in an intensive (25 hour per week) high-quality school program. Investigating responsive teaching is especially important in the light of findings that mothers of developmentally delayed children tend to be more directive (not responsive) when interacting with their children (Spiker, et al., 2002).

Lewis and Goldberg (1969) suggest that this responsive style of interaction has such a positive effect on children's development because it facilitates the child's feelings of control and self-efficacy. This contributes to the child's sense of competence and so increases the likelihood of the child engaging in subsequent interactions and learning situations. Mahoney and Perales (2003) propose that a responsive style of interaction enhances social behaviors that may be the same as the pivotal response behaviors seen to enhance the efficacy of discrete trial training interventions (Koegel, Koegel, Shosan and McNerny, 1999). Pivotal behaviors "are the processes children employ to learn and practice new behaviors during spontaneous interactions. Following this line of reasoning, it seems possible that as parents engage in higher levels of responsive interaction with their children, they are actually encouraging children to learn and use pivotal developmental behaviors, which are the processes enabling them to acquire untrained socioemotional competencies" (Mahoney and Percales, 2003, p. 84). This would explain why studies using interventions focusing on these pivotal developmental behaviors show children learning skills that they then generalize to other learning situations (Koegel, Koegel and Carter, 1998; Kaiser, Carter, Koegel, 2003).

The ***SRP*** employs, exclusively, a responsive style of interaction that they call "giving control". Under the ***SRP***, each time a child makes spontaneous social contact, the adult responds in a "sensitive" manner as described above; additionally, when a child disengages from social contact, the adult responds by

respectfully withdrawing and waiting for a social cue from the child before pursuing any further interactions. Each time this happens, the child learns that s/he has control over her/his social environment. Considerable research shows that children develop to the degree that they have control over their behavior and their effects on the environment (MacDonald, 2004). A child inhabiting the fragmented, unpredictable, chaotic perceptual world described above, who is also extremely challenged by communicating his/her wants, and whose autonomic system appears to be out of control, does not have a sense of being in control of the world or even of his/her body in the way a typically developing child does (Bluestone, 2004). Thus, the importance of providing a social environment maximizing the child's sense of control can be seen.

That children with Autism do not have a sense of control in the world could explain why they seek out patterns—meaning, predictability and order in a chaotic world. Baron-Cohen (2004) found the content of rituals and topics of perseveration (of higher-functioning children and adults with Autism and Aspergers Syndrome) is not random, but tends to cluster in the domain of systems (including technical, natural and abstract systems). These systems are underlain with rules and regularities more easily grasped by the autistic mind (Baron-Cohen, 2004). The social world is not an organized system regulated by fixed rules but rather a fluid, ever-changing bombardment of sensory input. If the autistic child is to feel comfortable in the social world, then the social world must be made as controllable as possible to encourage the autistic child to participate. This is exactly what is done by the ***SRP***. So when a child in an ***SRP*** playroom disengages from the social interaction, the facilitator respects this and allows the child to disengage, does not keep pursuing the interaction as recommended in other relationship-based approaches (Greenspan & Wieder, 1998) and waits for the child to re-engage before continuing to build social interaction. When consistently immersed in a social environment of this nature, ***SRP*** proposes the child learns that he has control over the previously uncontrollable social world. This puts the child in the driver's seat and shows him that he can indeed effectively elicit a response from another when he chooses; this sense of control forms a foundation for reciprocal interaction (Dawson and Galpert, 1990). Koegel, Koegel and McNerney (2001) review data suggesting that "when children with Autism are motivated to initiate complex social interactions, it may reverse a cycle of impairment, resulting in exceptionally favorable intervention outcomes" (p.19).

2) A Positive Attitude Facilitates Deeper Social Connection

According to the ***SRP***, the next vital factor in facilitating the emergence of a genuine and spontaneous interest in the social world is the use of a positive attitude. A positive attitude is one of acceptance of the child, appreciation and enjoyment of the child and the animated expression of such. The ***SRP*** stands alone in its assertion of the critical importance of a positive attitude. There are two fundamental reasons for this emphasis.

a) Acceptance Promotes Responsiveness

The ***SRP*** suggests that only an attitude of acceptance and appreciation of a child will allow parents to maintain consistently a responsive style of interaction.

Acceptance is defined as non-judgment, i.e., not labeling the child, or his/her condition, with any value-judgments (good/bad, right/wrong). The ***SRP*** does not view this type of acceptance as a passive resignation to the child's condition but instead as the first step to actively encouraging the child to develop. Professionals teaching the ***SRP*** consistently observe that when a parent lacks acceptance (as defined here), they instead label the child as "wrong" in some way ("needs fixing", "abnormal", "defective", etc.). The ***SRP*** holds that a parent with that perspective will find it very challenging to be responsive, that is, not to be directive, not to "teach" something to his/her child, even when the parent cognitively understands the importance of being responsive and giving the child control. The cognitive architecture behind a responsive style of interaction has yet to be addressed in the literature and points to another avenue of research crucial for training parents to run home-based interventions.

This importance of a positive attitude is empirically supported by the work of Gerald Mahoney and colleges using the Maternal Behavior Rating Scale (MBRS; Mahoney, 1992). The MBRS has been used in a variety of studies to assess the link between parents' interactional styles and the development of their children. It has 12 items assessing four dimensions of interactive style: responsiveness, affect, achievement orientation and directiveness. Use of the MBRS has been instrumental in highlighting the importance of caregiver responsiveness in children's development. These studies additionally show the "affect" dimension is similarly correlated with increases in various developmental performance outcomes.

In the MBRS, the affect dimension is composed of five measures: Acceptance, Enjoyment, Expressiveness, Inventiveness and Warmth. Mahoney and Perales (2005) found both responsiveness and affect to be significantly related to increases in children's levels of language development, social competence, joint attention and self-regulation. Kim and Mahoney (2004) again found maternal responsiveness and affect to be significantly correlated with the child's level of engagement, with maternal responsiveness accounting for 33% of the variance and affect accounting for 30% of the variance. This research still requires replication with larger and more diverse samples; nonetheless, the emerging direction of this new field of research is in line with the observations of the ***SRP***—a positive attitude goes hand in hand with responsiveness in facilitating development in children with developmental disabilities.

b) Appreciation Encourages Engagement

The other key component of a positive attitude in the ***SRP*** is a genuine appreciation and enjoyment of the child; this builds on the foundation of acceptance. The ***SRP*** advocates the use of animated expressions of appreciation, enjoyment and delight in the child. The ***SRP*** proposes that this will encourage a greater frequency of social orientation, extend periods of joint attention and increase child affect and motivation level within a social interaction. This, it is suggested, leads to more and longer periods of social interaction that result in the child learning more new behaviors and skills.

Typically developing children who naturally orient to social stimuli and engage in joint attention with adults experience the displays of positive affect that typically accompany these periods of joint attention (Kasari et al., 1990). Shared affective experience serves to motivate the typically developing child to attend to and engage in joint attention with adults (Dawson et al., 2004; Trevarthan and Aitken, 2001). These experiences then facilitate the child's development into a social 'expert" as s/he attends to more and more initiations from adults and remains engaged in these interactions for longer and longer. Typical development revolves around mutual affective exchanges that both the child and adult find rewarding (Mundy et al., 1992). This process goes awry in children with Autism for two reasons that interact to create a negative feedback loop. First, the child with Autism engages in joint attention less frequently and for shorter periods than the typically developing child (Dawson et al., 2004), so has less opportunity to experience the positive affect associated with this social engagement. Dawson and Lewy (1989) suggest that this is because the affect-laden social interaction may be too over-stimulating for the autistic child due to the unpredictable and complex nature of these stimuli. Second, it appears that children with Autism are less likely to display positive affect when engaged in joint attention (e.g. smile while making eye contact) (Kasari et al., 1999) and are much less likely to smile in response to their mother's smile than typical children (Dawson et al., 1990). The result is that mothers of autistic children are less likely to respond to their children's smiles than mothers of typical children (Dawson et al, 2004), probably because the children's smiles were not viewed as communicative as they were not accompanied by eye contact. Thus, from an early age, children with Autism seem not to experience the delight and joy typical children are bathed in from birth that motivates them to keep moving towards deeper and deeper connections with other people. When this process is disrupted in otherwise typically developing children, for example when the mother suffers post-natal depression and does not engage as much in these affective exchanges, there can be serious effects for that child's development (Goldsmith and Rogoff, 1997).

The implication for treatment from this research again is clear: to redress this imbalance—to link joint attention to positive affect and motivate children to move towards more frequent and longer periods of joint attention in the way a typical child does. This is what the ***SRP*** claims to do. Whenever a child in an ***SRP*** playroom makes social contact (eye contact, language attempts or physical communication), he is greeted with a celebration: a visual and auditory display of positive affect and an expression of joy and delight from the adult to the child's initiation of joint attention. This is fine-tuned to the individual child's particular sensory requirement to maintain its function as a motivator and not allow it to become over-stimulating for the child.

The affect dimension of the MBRS (Mahoney, 1992) has five items, four of which—acceptance, enjoyment, expressiveness and warmth—involve directly, animatedly expressing positive affect and attitude to the child. It is this dimension (along with responsiveness) that has been closely linked to promoting child engagement and cognitive and language development. The fifth item on the MBRS affect dimension is inventiveness—the number of different approaches the adult

uses, his/her ability to find different games and activities to interest the child, different ways of using toys and inventing games with and without toys. This is also an important part of the ***SRP***. Once a child is engaged in a social interaction, the adult's intention is then to maintain that interaction for as long as the child will allow. Expressing positive affect is one way that those trained in the ***SRP*** maintain interactions; the second is through inventiveness or creativity. Decades of training people to use the ***SRP*** leads their trainers to assert that a positive attitude underlies the ability to be creative in the ways described on the MBRS. The logic is that when one is truly enjoying an interaction, one is more inclined to think of ways to add to the interaction to maintain it, whereas when one is not enjoying an interaction, one tends to be thinking of ways to end it. Again, the cognitive architecture underlying "inventiveness" warrants empirical investigation as an avenue for increasing the efficacy of professional and parental training.

The ***SRP*** suggests that the principles of taking a child-centered approach and having a positive attitude, when used in an optimally designed physical environment, have the effect of encouraging children with Autism and other developmental delays to engage more in social interaction. This has the effect of helping these children be more motivated to initiate and engage in social interaction and grow stronger in pivotal developmental behaviors which pave the way for learning new skills and information. Longitudinal studies involving children actively engaged in home-based ***SRPs*** are needed to investigate these observations more fully.

The ***SRP*** asserts (as do other proponents of home-based programs, e.g. Lovaas, 1973) that this approach must be applied intensively and consistently over time for maximum efficacy. A 30-minute session twice a week will not retrain a brain that for years has skewed itself away from the social world. Children in the ***SRP*** typically spend from 15 to 50 hours a week in the playroom being responded to in this way. Facilitators and parents are trained to be exceptionally observant and attentive to the child to maximize the number of spontaneous social orienting events that are responded to in this way.

3) Joining Exclusive and Repetitive Behaviors Promotes Social Interaction

This core principle of the ***SRP*** extends the principles of child-centeredness and responsiveness and takes them from a position radically different from that of any other treatment approach known by this author. A key behavioral symptom of Autism, not yet addressed by this paper, is the engagement in stereotypical, repetitive movements or activities. Traditionally, the approach to these behaviors has been to attempt to eliminate them, the rationale behind this being the more "normal" the child looks, the more likely s/he is to be accepted by peers, and thus increase the likelihood of successful social experience. This perspective, however, seems to have negated attempts to understand the function of these behaviors, and this aspect of Autism has received much less scientific scrutiny than any other (Turner, 1999). This perspective goes against the principle of acceptance and enjoyment of the child that has proved to be so fruitful.

The research that does exist in the domain of stereotypical and repetitive behaviors suggests that these repetitious behaviors are helpful to the child and are

not, in fact random byproducts of the disorder that serve no function (as has been suggested, e.g. Lewis et al., 1987). Repetition is a natural part of any child's development; Piaget (1952) noted that typically developing infants will repeat activities that affect the environment in ways that inspire their interest. Thelen (1979) found that typically developing infants show a variety of rhythmic and pronounced stereotypic behaviors, each with a characteristic age of onset, peak performance and decline. These behaviors appear to mark unmistakable phases in the stages of neuromuscular development. Children seem to move through these behaviors until they have gained a full sense of mastery over their muscles and, presumably, until they can predict the effects of their own movements on the environment. Militerni et al (2002) looked at repetitive behaviors in two age groups of children with Autism. They found that the younger children (age 2-4 years) exhibited motor and sensory repetitive behaviors while those in the higher age group (7-11 years) had more complex repetitive behaviors. Similarly, those children with estimated higher IQs also showed more complex repetitive behaviors. Militerni et al (2002) suggest that these repetitive behaviors may be equivalent to the motor and cognitive behaviors seen in typical development.

Needless to say, in children with Autism and related disorders, these behaviors are much more pronounced, more intense and engage more of the child's attention than in typically developing children. Herstein et al (2001) suggest that children with Autism may employ repetitive behaviors in an attempt to control an autonomic system that fails to govern itself. Herstein et al (2001) measured skin conductance responses (SCR) in normal and autistic children in a variety of situations. They found that the SCRs of children with Autism started rising at the beginning of the experiment and continued to rise, whereas the typically developing children's SCR returned to normal baseline level with the progression of the experiment. It appeared that the children with Autism where not able to bring their SCR levels down once they had started to rise. Attempts at interaction with people exacerbated SCR levels. The researchers found, however, that the children with Autism could bring down the SCR levels by plunging their hands into a container of dry beans. Similarly, sucking sweets, being wrapped in a heavy blanket and receiving deep pressure helped the children with Autism lower their SCR levels. They also discovered that a subset of children with Autism was characterized by a flat level of SCR that was only increased by extreme behaviors (e.g. self-injury, climbing, etc.).

Herstein et al (2001) additionally found that interruption of these self-stimulatory and calming activities by other people "often produced extremely large responses with agitated behavior following immediately" (p. 1885). They go on to suggest that "the resistance to change one sees in autistic children may be caused by or exacerbated by bursts of sympathetic activity, which the child actively tries to avoid or dampen down" (Herstein et al., 2001, p.1886). Herstein et al (2001) suggest that the autonomic nervous system of the autistic child is on constant alert; every incoming stimulus is tagged as relevant and so the child acts to shut the system down (conversely in the subset of children with low autonomic activity, it seems that nothing is tagged as relevant and extreme behaviors are engaged in to produce a sense of relevance). This is consistent with the research on perceptual filtering challenges in those with Autism cited above. It has been suggested that

the amygdala-limbic system may be involved, as this system typically is responsible for attaching a sense of value to incoming perceptual stimuli and is found to be abnormal in those with Autism (Schultz, 2005; Critchley et al., 2000; Pelphrey et al., 2004; Akshoomoff et al, 2002; Baron-Cohen et al, 2000).

This work indicates that the repetitive, self-stimulatory behaviors of children with Autism are not random or functionless but actually help the child to regulate his own autonomic system in a quest for homeostasis (Nijhof et al., 1998). Autobiographical reports from adults with Autism again support the idea that repetitive behaviors serve to calm and soothe (Bluestone, 2004). Judith Bluestone likens these activities to meditation—turning off parts of the mind or body by intensely focusing on one thing—and points out that meditation has been accepted by the Western medical establishment for over 30 years as one of the best ways to reduce stress and increase mental organization (Bluestone, 2004). Willemsen-Swinkels et al (1998) found that autistic children who were negatively excited showed a slower heart rate after they began engaging in a repetitive activity. Herstein et al (2001) predict that if children are prevented from engaging in these calming activities, one would expect to see signs of chronically high sympathetic activity. The biochemical consequences of this are elevated levels of cortisol and adrenaline. These hormones interfere with the ability to concentrate, learn and remember and increase vulnerability to viruses, over-reactivity to medications, and heightened sensitivities to certain foods or food additives (Bluestone, 2004), all of which are commonly observed in children with Autism.

From a treatment standpoint, this research points to the need for a new perspective on repetitive behaviors. Rather than seeing these behaviors as something holding the child back from social acceptance and thus to be eliminated, this new perspective sees repetitive behaviors as useful to the child—something to be worked with rather than fought against. The ***SRP*** sees repetitive behaviors as functional and an avenue for building rapport which will form the basis of more expansive social interaction. Rather than trying to eliminate repetitive behaviors from the autistic child's repertoire to make the child more socially acceptable, the ***SRP*** facilitator starts with acceptance of the child—a deep, genuine appreciation for that child and holding the perspective that all his/her behaviors are attempts to take care of him-/herself. This attitude allows the ***SRP*** facilitator to a) not attempt to stop the child when he is engaging in repetitive, self-stimulatory behaviors, but wait for the child to spontaneously engage in social interaction and b) physically demonstrate this acceptance by joining in with the repetitive activity. This, the ***SRP*** suggests, is a more powerful way of communicating to the child that s/he is accepted and appreciated than a solely verbal communication and of demonstrating to the child that s/he has control over the interaction. This is a radical departure from more traditional approaches to Autism, but is one that has been shown to be effective in helping children with Autism to engage in social interaction more and, seemingly paradoxically, to spend less and less time engaging in repetitive, self-stimulatory behaviors.

Numerous studies have found that imitative play facilitates social responsiveness in children with Autism; that is, joining in with their self-stimulatory, repetitious behaviors encourages children to engage more in social

interaction. Dawson and Adams (1984) found that autistic children who had a low level of imitative ability were more socially responsive, showed more eye contact and played with toys in a less perseverative manner when the experimenter imitated the child instead of modeling other either familiar or unfamiliar actions. A similar study found that children with Autism would look at the experimenter more frequently and for longer periods when the experimenter imitated the child's play (Tiegerman and Primavera, 1984). Dawson and Galpert (1990) took this line of investigation even further. They asked mothers to imitate their child's play for 20 minutes each day for two weeks. At the pre-intervention assessment, they found, as predicted by the earlier research, that autistic children's gaze at their mother's face was longer, and their toy play more creative, during imitative play sessions as compared to free play sessions. After only two weeks of this intervention (20 minutes a day), the post-intervention assessment found significant cumulative increases in duration of gaze at the mother's face and of creative toy play. Parents of children using the ***SRP*** are instructed to engage in imitative play ("joining") whenever their child is playing in an exclusive or repetitive way.

Another study experimenting with imitating autistic children split children into two groups; those of one group spent time with an adult who imitated their play, while members of the other group spent time with an adult who simply tried to play with the child on three separate occasions. In the second session, children in the imitation group spent a greater proportion of time than the other children showing distal social behaviors towards the adult—looking, vocalizing, smiling and engaging in reciprocal play. In the third session, children in the imitation group spent a greater proportion of time than the other children showing proximal social behaviors towards the adult—being close to the adult, sitting next to the adult and touching the adult (Field et al, 2001).

These results, that imitative play increases social responsiveness and joint attention, should not be surprising to those who study the development of typical infants and children. Parents of typically developing infants commonly imitate their infants' expressions, often in an exaggerated way (Malatesta and Izard, 1984; Papousek and Papousek, 1977; Trevarthen and Aitken, 2001). In fact, infants of 3 and 5 months old have been seen to prefer interaction with people who have been responsive to them in the past and avoid interaction with those who were unresponsive or whose responses were not congruent with the infant (Bigelow and Birch, 1999). This imitation forms the basis of communication and further growth by promoting a sense of shared mutuality, an experience of congruence by both partners that is mutually motivating (Nadel et al., 1999; Uzgiris, 1981; Panksepp et al., 1994). This normal interplay of non-verbal imitation between mother and infant is widely documented to be essential to promoting the child's neurological, cognitive, social and emotional growth (see Trevarthen and Aitken, 2001). Studies with typically developing (Rollins and Snow, 1998) and autistic children (Mundy et al., 1990; Rollins, 1999) suggest that emotional engagement and joint attention are more critical to language development than is instrumental use of language. Emotional engagement and joint attention are increased by imitative play. Trevarthen & Aitken state, "Imitative responses are found to be attractive to autistic children and can act as a bridge to collaborative play or communication, and improve the child's access to language (Dawson & Galpert,

1990; Nadel, 1992; Nadel and Peze, 1993; Tiegerman & Primavera, 1982, 1984)" (Trevarthen & Aitken, 2001, p.32). Siegel (2001) states simply that "Children need such joining experiences because they provide the emotional nourishment that developing minds require" (p.78).

Studies with typical adults indicate that this intuitive use of imitation continues into adulthood, maintaining its function of building rapport between two people. Chartrand and Bargh (1999) found that participants mimicked, non-verbally, by a confederate in a variety of situations reported liking that confederate more than confederates who did not mimic them. Those who were mimicked also described the interaction as more smooth and harmonious. Similarly, Bernieri (1988) found a strong relationship between reported rapport and degree of reported movement synchrony. When looking at non-conscious mimicry, Larkin and Chartrand (2003) found that in situations where participants had either a conscious or non-conscious desire to affiliate with their experimental partner, they were more likely to non-verbally mimic that person than when they had no desire to affiliate with that person. It seems that mimicry can build rapport between adults. It has been suggested that this behavior evolved from initially having survival value (learning new skills) into a form of social glue that holds relationships together and allows access to a particular group (Larkin et al, 2003).

Imitation helps build rapport between typical adults, typical infants or children and their caregivers and between adults and autistic children. Dawson and Galpert (1990) postulate that imitative play works so well for autistic children because it puts the child in control (one of the fundamental principles of the ***SRP***). This gives the child a predictable and salient response to his actions. "This strategy maximizes the possibility that the child will learn to expect and effectively elicit a response from another person, in this way providing a foundation for reciprocal social interaction" (Dawson and Galpert, 1990, p.152). Additionally, imitative play is sensitive to the child's optimal range of sensory stimulation; the child can adjust the amount of sensory stimulation by adjusting his or her own actions creating an easy, controllable and predictable form of social interaction that is more digestible for the autistic child. Field (1977, 1979, cited in Dawson and Galpert, 1990) studied the effects of maternal imitation with pre-term infants who showed high levels of gaze aversion, negative affect and elevated tonic heart rates. When mothers imitated their infants' behavior, the infants became more attentive than when mothers spontaneously interacted with their infants. Decreases in tonic heart rate were recorded during imitative play. Applying this research to the autistic population by examining physiological measures during imitative play has yet to be done.

Dawson and Galpert (1990) conclude that "imitative play may be used to provide a foundation for establishing social interest and interactive play. This foundation can then be built upon by using other, more sophisticated, interactive strategies and games" (p. 161). This is exactly how imitative play, or "joining," is used by the ***SRP***. Children are "joined" or imitated while they are playing in a self-stimulatory and exclusive way because the ***SRP*** recognizes the curative, calming and organizing nature of this self-stimulatory play. Through joining the child rapport is created and a social bridge is built. A relationship of trust is formed as

the child learns that s/he is in control of the interaction and can initiate and end it at will, without the need for language. It follows then that children will start to initiate social contact more and more when immersed in this environment. This will open up increasing opportunities to build on this connection in a manner motivating to that child (as described above) and thus increase the frequency and duration of joint attention that leads to the child's neurological, cognitive, social and emotional development. Observational analysis of parents and ***SRP*** facilitators working with autistic children is required to fully understand the subtle variables involved in this type of interaction.

The technique of joining builds on the principle of being responsive. In Trivette's (2003) definition of the responsive style of interaction, an appropriate response is one that matches the child's developmental level and mood. The ***SRP*** adds a further requirement—that the adult's response be sensitive to the child's level of exclusivity, exclusivity being the child's level of *motivation for social interaction*. The ***SRP*** maintains that all children, regardless of diagnosis, have the capacity to move along an exclusive-interactive continuum. At the exclusive end of this continuum the child is not motivated for social interaction, and is absorbed in his own world; this state is usually accompanied by repetitive behaviors and activities or perseveration on repetitive topics. At the interactive end of the continuum, the child is motivated for interaction with another person and shows interest by maintaining joint attention, displaying positive affect and participating in an interactive and fluid activity or conversation. Observing the child's level of motivation for interaction, or degree of exclusivity, is the first vital step in the ***SRP*** to responding in a manner that will facilitate a) the maximum amount of responsiveness from the child and b) the maximal degree of new learning.

When the child is exclusive (not motivated for social interaction), the ***SRP*** holds that the most effective response is to join with the child's behavior. This type of response allows the child to use their repetitive activity to gain control of their autonomic system and facilitates more spontaneous social orienting from the child. As the child's level of motivation for social interaction increases, s/he will start to spontaneously orient to the adult more (e.g. by making eye contact, attempting verbal or non-verbal communications or making physical contact). The ***SRP*** trained facilitator will begin to respond to these behaviors in the manner described by Trivette (2003)—by offering an activity they believe the child will find enjoyable. As the child's level of motivation for social interaction increases, the frequency and duration of the child's spontaneous social orientations will increase, as will their displayed positive affect. Once the child has reached a level of motivation for social interaction characterized by frequent or sustained eye contact, positive affect and non-verbal or verbal attempts to re-initiate the activity, the ***SRP*** -trained facilitator will move into a style of interaction that combines responding to the child to maintain the level of motivation, and requesting the child to participate in new ways (e.g., use more or clearer language, use more eye contact, be more flexible, use academic or friendship skills, etc.). ***The Son-Rise Program***® **Developmental Model** (Hogan and Hogan, 2004) provides guidelines indicating which skill to focus on depending on the child's developmental level. Once the child is motivated for social interaction and for the particular activity on offer, s/he will make attempts at the new skill in order to maintain the interaction. When the

child's level of motivation changes, the facilitator will be responsive to this, observe where the child is on the exclusivity-interactive continuum, and respond accordingly.

It is through this subtle dance between maintaining a responsive interactive style, giving control, and excitedly requesting new skill use that the ***SRP*** claims to be able to facilitate extraordinary development in children with severe developmental disorders, as documented in the case studies by the founders (Kaufman, 1981; 1994). To the knowledge of this author, there is no research to date investigating the efficacy of changing one's responsive style based on the child's level of motivation for social interaction or an empirical investigation of the concept of an interactive-exclusive continuum. This is a gap in the literature that demands attention and could create a deeper understanding of children with Autism and the most effective way to facilitate social interaction with this population.

Conclusion

A wealth of research spanning half a century has painted a clearer picture of the disorder first outlined by Kanner in 1943. This has helped us gain a deeper understanding of the physiology, neurology and cognitive psychology of those with Autism and allows us to see some clear implications for treatment. The ***SRP*** developed over the past thirty years via a different route—from two parents' desire to reach their autistic child. Through their intensive experimentation, observation and deep longing to connect with their son, they developed a treatment approach that can now be seen to be supported by the more recent scientific literature. These two pathways—to essentially the same solution—have remained separate as the ***SRP*** has not been subjected to rigorous scientific study by independent researchers until very recently. The current work shows that the principles of ***SRP*** are solidly grounded in accepted theories of child development and supported by empirical study of the individual principles, although no study has yet addressed ***SRP*** in its entirety. The sheer number of families who have chosen to use ***SRP*** (over 8,000 to date) is testament to the fact that parents are looking for something other than what is offered by traditional approaches to Autism. Approaches such as the ***SRP*** thus warrant more empirical investigation.

The ***SRP*** is parent-led; that is, parents are empowered to act as facilitators, trainers and managers of their home-based programs. In the eyes of the ***SRP,*** training parents to implement therapy with their children is more effective than relying on schools or specific professionals to implement therapies because, as discussed above, the intensity of the approach is essential. A parent trained in the ***SRP*** is able to implement the principles and techniques inside and outside of the playroom, intensifying the child's immersion in a responsive, socially enhancing environment. Again, the literature supports the efficacy of home-based programs. One study assessing the relative efficacy of behavioral programs with autistic children compared residential, out-patient and home-based programs. They found that only the home-based group showed significant improvements on the

behavioral observation measures (Sherman, Baker, Lorimer, Swinson and Factor, 1987). Another study matched children receiving home-based behavioral treatments with those receiving conventional school-based and brief one-on-one interventions. Children receiving home-based treatments had significantly higher post-intervention IQs than their school-based counterparts; significant reductions in symptom severity were also found (Sheinkopf and Siegel, 1998).

More recent research has looked at changing the conventional discrete-trial format of traditional behaviorist approaches, to make them more adaptable to the home environment and thus more in line with the responsive nature of the ***SRP***. Delprato (2001) reviewed eight studies looking at normalized behavioral language interventions, defined as consisting of loosely structured sessions of indirect teaching with everyday situations, child initiation, natural reinforcers and liberal criteria for reinforcer presentation. In all eight studies with children with Autism, this method of language training was found to be significantly more effective than discrete-trial training. Kaiser and Hancock (2003) similarly found that teaching parents to implement naturalistic language intervention strategies at home can be highly effective. Furthermore, in the two studies in the Delprato (2001) review looking at parental affect, the normalized treatment yielded more positive affect than the discrete-trial training. In a study of families using ***The Son-Rise Program***® in their homes, Williams (2004) found that the families felt generally more positive since implementing the ***SRP*** and reported that interaction among the whole family had also improved.

The current literature supports an intervention for children with Autism that emphasizes a specifically designed physical environment, with a focus on enhancing social relationships, having a positive attitude and joining a child's repetitive behaviors. The ***SRP*** focuses on precisely these principles.

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