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Behavioural Intricacy Analysis – as Against "Elements of Behaviour" Modification in traditional and ABA Methodologies.

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ABSTRACT

Introduction: Current autism interventions, including Applied Behaviour Analysis (ABA) and occupational therapy approaches, often prioritise discrete behavioural elements, overlooking the multi-layered, dynamic interplay between developmental domains. This oversimplification risks reducing intervention fidelity and may compromise long-term outcomes for children on the autism spectrum.

Methods: This conceptual paper synthesises findings from recent empirical studies (2019–2025) on early developmental trajectories, neurocognitive processes, and social–emotional–cognitive interactions in autism. Using systematic literature selection criteria—relevance to behavioural intricacies, author expertise alignment, and methodological robustness—we identified recurrent "Intricacy Zones" spanning motor, sensory, attentional, social, cognitive, and neurobiological dimensions.

Results: The proposed Behavioural Intricacies Analysis (BIA) framework integrates these zones into a dynamic observational model guided by three principles: *Contextual Embeddedness* (behaviour analysed within situational and relational contexts), *Configurational Complexity* (meaning emerging from factor configurations rather than additive elements), and *Developmental Relevance* (interpretation aligned to neurodevelopmental stage). Operational definitions and measurable criteria are provided to maintain analytic precision.

Discussion: BIA offers a theoretically grounded alternative to element-based models, enabling more ecologically valid and personalised intervention planning. It addresses a critical gap in autism therapy by emphasising the identification and modification of underlying behavioural configurations rather than surface behaviours. The framework's clinical utility lies in enhancing diagnostic sensitivity, guiding targeted therapeutic design, and reducing the risk of intervention misalignment caused by oversimplified assessment tools.

Conclusion: By systematising the observation and interpretation of behavioural intricacies, BIA supports a paradigm shift toward interventions that honour the complexity of child development. Future empirical validation is required to establish its efficacy and adaptability across diverse neurodevelopmental profiles.

Keywords: Behavioural Intricacies Analysis, autism spectrum disorder, developmental cascades, configuration factors, social attention, dynamic observation, personalised intervention.

1. Introduction - Need for a Paradigm Change:

Autism is often seen as Autism spectrum disorder (ASD) as a neurodevelopmental condition marked by deficits in social communication and interaction, as well as restricted and repetitive patterns of interests and behaviours that become apparent in early childhood (Wolff & Piven, 2021) and prevalent in infants delivered before 29 weeks of gestational age and potentially linked to recognized risk factors (Busque et al., 2022).

The concept of Behavioural Intricacy Analysis emerges as a necessary evolution in understanding human development, particularly in the context of infants, where traditional methodologies such as ABA may fall short.

Traditional behaviour modification approaches often focus on discrete elements of behaviour, treating them in isolation without considering the complex interplay of various developmental domains and environmental factors. Skinner in his 1974 book has expressed criticism towards theories of behavioural development that emphasized the topography of behaviour "to the detriment of other aspects of the reinforcement contingencies," asserting that while a comprehensive account of the topography of behavioural changes is significant, it "must be complemented by a similarly thorough documentation of the circumstances in which it was obtained" (Jiménez, É. L. O., Tsutsumi, M. M. A., and Laurenti, C et.al 2022)).

Comprehensive framework referred to as the developmental cascades perspective explains that within a multifaceted developmental system, even minor alterations in one area can significantly influence growth in other areas (Iverson J. M. 2022). The development of infants is characterized by continuous transformations occurring both within and outside of their bodies.

These transformations are not simply linear; they acquire the ability to sit on their own, walk proficiently, and participate in numerous interactions with various objects. During these formative years, infants also start to cultivate their language skills. These occurrences are not standalone phenomena. This concept for instance, a minor variation in an infant's motor skills can influence their cognitive development, social interactions, and emotional regulation. This interconnectedness suggests that focusing solely on isolated behaviours may miss critical insights into the wholistic development of the child.

The developmental cascades framework, as discussed by Massand E and Karmiloff-Smith (2015), provides a more comprehensive understanding of these interactions. It emphasizes that initial variations within a single system can lead to significant cascading effects that impact not only the individual but also their caregivers and the broader environment. This perspective is crucial for understanding neurodevelopmental disorders, as it acknowledges the complexity of development and the need for a theoretical framework that spans multiple levels of analysis and timeframes.Therefore, any therapy that aspires to help autism should have inherent potential to address these intricacies.

Gitimoghaddam, M., Chichkine, N and McArthur, L et.al (2022) suggests that integrating the principles of the neurodiversity paradigm into Applied Behavior Analysis (ABA) necessitates an acknowledgment that ABA is not the sole form of assistance available to individuals on the autism spectrum. But their another suggestion that - whenever feasible, practitioners of ABA ought to pursue interdisciplinary collaboration to effectively address the varied needs of our clients, seems to be lopsided. The author has personally observed some university approved Occupational Therapy course theses mention behaviour modification under the headings of ‘Occupational Therapies’ and many Occupational Therapists claim they can give Cognitive Behaviour Therapy.

There are attempts to dilute psychological frame of references by incorporating into scientifically unsound occupational therapy concepts (For ex: The cognitive behavioural frame of reference – article by Edward A.S. Duncan available on https://musculoskeletalkey.com/the-cognitive-behavioural-frame-of-reference/).

The incorporation of a cognitive behavioural frame of reference into occupational therapy illustrates a persistent tendency within the profession to appropriate established psychological models, repackage them under occupational therapy nomenclature, and thereby blur the theoretical boundaries of the source discipline. While often presented as “integration,” such practices do not arise from a unique or original conceptual base within occupational therapy but rather from the adaptation of pre-existing frameworks, often without advancing new theory or producing distinctive methodological innovations. This approach risks eroding theoretical precision, misrepresenting the origins of key constructs, and weakening the profession’s ability to assert an independent body of knowledge capable of withstanding scholarly scrutiny.

The author too tried to elicit relevant answer to the question of ‘what is the unique Subject matter of Occupational Therapy” and “how to differentiate occupational therapy from psychotherapy based on the subject matter”. His attempt with numerous occupational therapy students of both UG and PG level (at least in India) did not yield a professional answer. If brethren OTs do not, mistake the current author would like to insist that Occupational Therapists stick to the subject matter

of 'productive activities and their relevant modifications" or getting Occupational Therapy defined as "scientific study of modification and adaptation of productive and leisure activities to suit the individual need, maturation and strength".

Group of researchers (Randell, E., Wright, M., and Milosevic, S et.al 2022) on a project funded by the National Institute for Health and Care Research (NIHR) Health Technology Assessment programme found that occupational therapy intervention was no better than standard care. The intervention failed to show any clinical advantage over standard care, effects observed in subgroups were merely suggestive of hypotheses, while the intervention may prove beneficial for personalized performance objectives, it remains uncertain if these effects were supplementary to standard care or if they were sustained.

Economic assessments indicate that sensory integration therapy does not provide a cost-effective alternative when compared to standard care alone. Occupational therapists found to have placed more emphasis on sensory methodologies and cognitive frameworks. The application of sensory-oriented therapies and their influence on engagement in daily activities remains a subject of debate, in addition to the financial implications of the therapy (Saneii, Seyed H and Esmaili, Samaneh K 2019).

Sensory Integration Therapy and massage interventions demonstrated the highest quality of evidence, but each demonstrated just moderate effectiveness score, while adaptive seating, environmental modification, weighted vests, and sensory diets/strategies found still lower (Roberge, Nicole and Crasta, Jewel E 2022).

American Academy of paediatrics report by Hyman SL, Levy SE, Myers SM, (2020) also made evidence-based recommendations that Sensory-oriented interventions, usual procedures of Occupational Therapists, which encompass skin brushing, proprioceptive stimulation through the application of weighted vests, and kinesthetic stimulation (for instance, swinging or utilizing specialized seating like a therapy ball to adjust arousal levels), have not yet received endorsement in the peer-reviewed literature. Meta-analysis examining the effectiveness of early interventions by American Psychological Association (APA) team (Sandbank M., Bottema-Beutel K and Crowley S et.al 2020) determined that, in the absence of any study quality criteria, favourable results were observed for behavioural, developmental, and NCB interventions, while the analysis of solely randomized controlled trials (RCTs) with a low risk of detection bias, found no evidence supporting positive outcomes for young children diagnosed with Autism Spectrum Disorders (ASDs).

Similarly, early interventions resulted in favourable outcomes regarding cognitive ability, daily living skills, and motor skills; however, no positive results were observed for other aspects of cognitive ability, language, and adaptive behaviour (Daniolou, S., Pandis, N., and Znoj, H. 2022).

There was evidence of low to moderate certainty indicating that clinician-assessed outcomes did not demonstrate significant treatment effects for autism symptomatology, cognitive outcomes, receptive language, or expressive language. Additionally, neurocognitive outcomes, including EEG and eye tracking, exhibited heterogeneity with inconsistent results. Furthermore, there is low to moderate certainty evidence suggesting that very early interventions have a limited effect on neurodevelopmental outcomes by the age of 3 years (McGlade, A., Whittingham, K and Barfoot, J et,al 2023).

Therefore, there is a need for systematizing a new framework that would be useful in bringing wholistic development in autism children.

2. Aims and Objectives

To highlight the intricacy areas that should be tapped to systematize better therapy for autism, possibly better than current therapies.

To highlight relevant paths to systematize better therapy for autism.

3. Methodology

Various research papers with a sound research base were selected. The criteria were:

1. **Relevance** — Findings must highlight the “intricacies” of autism and its symptoms.
2. **Qualified Authors** — Occupational therapy research by OTs, psychology methods by psychologists, and medical portions by medical experts.
3. **Acceptable Methodology** — Evidence-based, valid conclusions.

The identified intricacies from different works have been highlighted and the Intricacy Zones are not permanent but logically concluded from specific research papers.

4. Intricacies and their Bases:

Early trajectories such as pull-to-sit movements can predict outcomes in social communication (Bradshaw J., Shi D., Federico A., Klaiman C., and Saulnier C (2023).

We could achieve better results if assess the increased variability associated with atypical development. This methodology would demand for a more nuanced examination of how real-time fluctuations in children's behaviours can reveal underlying factors contributing to their unique developmental trajectories. It encourages a shift from a simplistic view of behaviour modification to a more integrative approach that considers the intricate web of interactions influencing development, in line with Intricacies Psychology (Ramesh Kumar G S 2022).

However, these movements alone do not specifically indicate the presence of ASD. Infants diagnosed with ASD demonstrate variations in social-communication abilities as early as 9 months, suggesting that traditional behavioural modification approaches may not fully capture the underlying mechanisms contributing to these challenges. For example, ABA methodologies concentrate on the direct or nearby factors contributing to problematic behaviours, as well as on the execution of contingency management interventions (Feeney, T. J., and Gould, K. R. 2022)

The significance of pull-to-sit skills lies not only in their role as indicators of developmental progress but also in their broader implications for language development. These skills are intricately linked to posture and midline coordination, which are foundational for effective communication. In contrast, head lag may serve as a unique early marker of anticipatory action coordination, particularly relevant to ASD. This distinction highlights the need for a more comprehensive approach that considers the intricate relationships among motor skills, anticipatory responsiveness, and visual-motor integration.

By investigating these relationships, Behavioural Intricacy Analysis should be set to provide insights into the essential mechanisms that influence early social and language development. This approach views that behaviour is not merely a series of elements to be modified discretely but a complex interplay of developmental factors that must be understood and dealt with.

By focusing on the intricacies of developmental trajectories and their implications for social communication, Behavioural Intricacy Analysis should be set to offer a more wholistic framework for understanding and facilitating behavioural change.

While Monitoring nursery rhymes in early childhood serves as an indicator for future vocabulary growth (Menn, K. H., Ward, E. K and Braukmann, R et.al 2022), anticipated link between the ability to track sung nursery rhymes in infancy and the development of autism symptoms, is challengeable (Belteki, Z., Lumbreras, R. and Fico, K et.al (2022).

This result is particularly surprising given that children with autism often face challenges with language and relationship between tracking abilities and language growth was not new. One interpretation of this outcome is that the coherence of speech and brain activity primarily reflects the linguistic dimensions of autism symptoms, whereas the Autism Diagnostic Observation Schedule (ADOS) evaluates a broader range of behaviours associated with autism. Therefore, the ability to track speech may be more closely related to the onset of language-specific difficulties rather than the wider spectrum of autism symptoms. Therefore, there are many intricacies that need to be addressed including Ability to Track Sing Rhymes, Language Challenges, Tracking Abilities and Language development, as a 'Intricacy Zone'.

It could be related to a possible fact that 'development is the ability organize, link and utilize as resources the changes that occur in every psychological and biological element".

Importantly, the development at any given day seems to be structured on the hierarchy of Social, Emotional and Cognitive Development – that the basic level social development is supported by required physical growth. In that way, attention should be viewed as first of all a reactive force for externalizing and subsequent Social skill and further enriched by Emotional and Cognitive skill thereupon.

In other words, mere deprivation in social aspects can ensure damage to contingent Emotional and Cognitive development. Human attention begins at birth as an outwardly directed impulse, stimulated by the sensory suppression experienced in the prenatal environment.

Social engagement and responses by the surroundings act as the initial guiding mechanism for this impulse, prior to the complete development of cognitive networks that facilitate sustained executive attention.

Research (Portugal, A.M., Viktorsson, C., Taylor, M.J. et al 2024) indicates that variations among young infants in their choice of perceptual input—whether social or non-social—are inherited, offering a developmental viewpoint on the interaction between genes and the environment as it manifests in eye movement patterns.

Study by Siqueiros-Sanchez, M., Bussu, G and Portugal, A. M et.al (2025) also supports the concept of Intricacies Behavioural Modification, emphasizing the nuanced understanding of how both genetic predispositions and unique environmental contexts shape behavioural tendencies, moving beyond traditional and ABA methodologies that often focus solely on observable elements of behaviour modification.

Inadequacies in relational integration mechanisms, coupled with shortcomings in social comprehension, result in autism spectrum disorder (Demetriou, A., Spanoudis, G., and Papadopoulos, T. C. 2025).

Inadequacies in executive functions lead to attention-deficit and hyperactivity disorder. Inadequacies in symbolic representation give rise to specific learning challenges, including dyslexia and dyscalculia. Therefore, what couple with what and how the impact arises need to be the core part of the therapy once such as a therapy is expected to be non-amateur, professional, and based on human values, aimed at helping innocent needy. Therefore, Relational Integration Mechanisms, social comprehension, Executive Functions, Symbolic Representation function, Interaction Between genes and Environment and Selective Perception / Perceptual Choice form the 'intricacy zone'.

Social communication is heavily reliant on the social brain, with the fronto-temporo-parietal cortex and cerebellum being vital components (Lopes da Cunha, P., Fittipaldi, S., and González Campo, C et.al 2023; Van Overwalle, F., Manto, M., and Cattaneo, Z.,et.al (2020) The fronto-parietal-cerebellar networks are crucial for the preprogrammed selection of movement sequences, which can lead to both adaptive movements and the development of repetitive behaviours (Welniarz, Q., Roze, E., and Béranger, B et.al 2021). In the first year of life, these brain regions undergo a gradual process of eliminating temporary structures, such as the subplate in the fronto-temporo-parietal cortex and the external granule layer (EGL) in the cerebellum. By the latter half of the first year, the brain systematically removes nearly all transient fetal structures, allowing the developing permanent neural circuits to take over behavioural programming (Thompson R.A. 2024; Lammertink F, Vinkers CH, Tataranno ML, and Benders MJNL 2020; Kostović, I., Sedmak, G., and Judaš, M.

2019). Therefore, social communication, preprogrammed selection of movement sequence, adaptive movements and development of repetitive behaviours form another distinct set of 'intricacy zone'.

It is possible that atypical dissolution of these temporary structures may create conditions conducive to the early signs of ASD. This hypothesis is supported by evidence showing that screening questionnaires and parental concerns about infants with a high familial risk become predictive from 12 months onward, coinciding with the period when transient fetal structures have largely been eliminated (Ozonoff S, Young GS, Steinfeld MB, et al 2009; Tran, A. T., Del Rosario, M., and Nosco, E et.al 2021; Meera, S. S., Donovan, K., and Wolff, J. J et.al 2021; Rowberry, J., Macari, S., Chen, G., Campbell, D., Leventhal, J. M., Weitzman, C., & Chawarska, K. 2015). Probable atypical dissolution of the temporary structures and Early Signs of ASD are forming a separate 'Intricacy Zone'.

The growth of the amygdala between 6 and 12 months is part of a complex interplay of brain and behavioural changes that precede the onset of autism spectrum disorder (ASD) (Shen, Mark 2022). Notably, atypical amygdala growth is associated with sensorimotor and attentional challenges in infants who later develop ASD, as well as significant increases in the cortical surface area of the visual cortex. This relationship raises the question of whether deficits in visual attention could lead to altered experiences, resulting in impaired activity-dependent synaptic pruning and subsequent amygdala overgrowth.

Furthermore, the marked difference in the timing of cognitive deficits between ASD and Fragile X Syndrome (FXS) highlights that ASD is characterized by a gradual decline in cognitive function during infancy. This underscores the importance of examining the period prior to this decline and the related brain changes, emphasizing the critical need for presymptomatic detection and intervention. Ultimately, the results of this study suggest potential early intervention strategies, such as those focusing on experience-dependent development or neuroinflammation, which may help alter this developmental trajectory during infancy.

Therefore, Visual Attention changes leading to Altered Experience towards activity-dependent synaptic pruning, Cognitive Decline, the period prior to decline form a potential 'Intricacy Zone.

It was discovered that social anxiety and traits associated with autism influenced various temporal phases of eye-gaze (Ni, W., Lu, H., Wang, Q., Song, C., and Yi, L. 2023). Specifically, social anxiety impacted only the duration of the first fixation on the eyes, whereas autistic traits were linked to eye avoidance at multiple time intervals during the later stages. Notably, we identified an interactive effect between autistic traits and social anxiety regarding initial eye attention: individuals with high scores in autistic traits exhibited a tendency for social anxiety to correlate with early avoidance of the eyes, in addition to maintaining attention once fixated on them.

Autistic traits are linked to a delayed response to eye contact, independent of any influence from social anxiety (Franke, C.J., Griffin, J. W., and Naples, A. J et.al 2024). However, questions remain about the relative importance of autistic traits and social anxiety concerning eye orientation measures. Therefore, the intricacies of Social Anxiety, First Fixation of Eye Vs Avoidance Vs Multiple Eye Fixations, Maintaining Attention once Fixated, Delayed Vs early Eye Contact Response and autistic features form an 'Intricacy Zone' and to be addressed in whatever therapy is systematized.

Furthermore, the relationship between resting state electrodermal activity (EDA) and BOLD functional connectivity (Kleberg, J L 2015) may differ between individuals with and without Autism Spectrum Disorder (ASD). The study also revealed signs of reduced tonic EDA levels in the ASD group. Several brain regions associated with social cognition, emotional processing, and attention displayed atypical connections to EDA in individuals with ASD. This finding suggests that arousal may play a significant role in understanding the deficits observed in these domains among those with ASD, further adding to the need of intricacies behaviour analysis and therapy systematization. Therefore, Social Cognition, Emotional Processing, Attention, Arousal form a probable 'Intricacy Zone'.

These insights supporting a new intervention concept of "Intricacies Behavioural Modification," which contrasts with traditional and Applied Behaviour Analysis (ABA) methodologies that often focus on discrete elements of behaviour modification (Briggs, A. M., Zohr, S. J., and Harvey, O. B. 2024; Hillman, C. B., Lerman, D.C., and Kosel, M. L. 2021; Kodak, T., Fisher, W. W., Paden, A., and Dickes, N. 2013). By recognizing the nuanced interplay between social attention mechanisms and emotional responses, "Intricacies Behavioural Modification" emphasizes a more holistic approach to understanding and addressing behavioural challenges, particularly in individuals with Autism Spectrum Disorder and SAD. This approach advocates for a deeper exploration of the underlying cognitive and emotional processes that influence behaviour, rather than merely modifying observable actions.

A co-twin control study (Neufeld, J., Hagström, A., and Van't Westeinde, A et,al. 2020) revealed that individuals diagnosed with Autism Spectrum Disorder (ASD), including those with high-functioning autism, necessitate a greater number of visual components to construct a global gestalt on the Fragmented Pictures Test. This indicates a diminished capacity for global processing, even when accounting for shared genetic factors or familial influences. These results are pertinent to the previously reported developmental delay in global shape perception. Challenges in perceptual encoding and mnemonic recognition—extending beyond mere memory issues that the development of advanced face processing may be hindered in individuals with ASD (Stantić, M., Ichijo, E., Catmur, C., and Bird, G.2021; Hartston, M., Avidan, G., Pertzov, Y., and Hadad, B.-S. 2023).

Such functions may be disproportionately influenced within the framework of visual processing of socially significant stimuli, not linked to either IQ or traits resembling autism, but pertain to clinical status (acting as a nonspecific risk factor), rather than being directly associated with the autistic behavioural phenotype itself (Sarovic, D., Schneiderman, J., and Lundström, S., et.al 2024). Currently proposed need for Intricacies Behaviour Analysis & Therapy are thus necessarily contrasting from traditional ‘elementary’ approach of ABA. Therefore, Gestalt Perception / Global Processing, Perceptual Encoding and mnemonic recognition, memory, advanced face processing all form a ‘Intricacy Zone’.

Children with ASD exhibit activity in cortical areas associated with visual, motor, and social processing. Furthermore, regression analyses indicated several cortical regions in individuals with autism where brain function shows a significant correlation with dimensional assessments of ASD characteristics (Yang, D., Svoboda, A. M and George, T. G et.al 2024)). Intricacy Zone analysis should address the mutual link between domains of visual, motor and social processing.

However, intricacies to be studied due to the findings such as Individuals with autism spectrum disorder (ASD) face challenges in face memory but not in face perception (Weigelt, S., Koldewyn, K., and Kanwisher, N. 2013) and global motion processing deficit thresholds comparable to control groups (Van der Hallen, R., Manning, C., Evers, K., and Wagemans, J. 2019), and that individuals with Autism Spectrum Disorder (ASD) exhibited markedly reduced accuracy in recognizing facial identities compared to their typically developing counterparts (Song 2023).

In simple terms, face is perceived but not easily remembered and identities not recognized. Mere ‘elementary’ approach of ABA’s facial perception will jot do any future saving utility value to autistic children. The author advocates for an intricacies analysis approach that considers the unique cognitive and perceptual challenges faced by individuals with autism. Face perception, Global motion processing, Recognizing facial identities, Perceptual Decision-Making extension to more intricate but socially relevant stimuli also form a different ‘Intricacy Zone’.

The mechanisms that govern perceptual decision-making extend to more intricate and socially relevant stimuli, such as biological motion (Oguz, O. C., Aydin, B., and Urgen, B. A. 2024).

Although children diagnosed with ASD are capable of behaviourally distinguishing biological motion, their neural responses do not exhibit automatic selectivity between upright and scrambled motion. Nevertheless, when they focus explicitly on the stimuli, their neural specificity shows improvement (Knight, E. J., Krakowski, A. I and Freedman, E.G et.al 2022). These results indicate that impairments in automatic dynamic attention—rather than reasoning specific to tasks—may significantly hinder the early sensory encoding of biological motion in individuals with ASD. Participants with

ASD exhibited distinct local networks associated with Biological Motion Perception, which may contribute to impaired complex social interactions (Siemann, J., Kroeger, A., and Bender, S., et.al 2024). Behaviourally Distinguishing Biological Motion, Focus on Stimuli, Automatic Dynamic Attention and Social Interaction (Social Interaction often falls in multiple 'Intricacy Zones') form an 'Intricacy Zone'.

Research by (Koldewyn, Kami., Jiang, Yuhong V., Weigelt, Sarah and Kanwisher, Nancy 2013) strongly supports the idea that children with ASD can focus on both local and global aspects of stimuli but are less motivated to attend to and report global information. The implications of this motivational difference may be as significant as those stemming from actual cognitive impairments.

Recognizing the distinction between disinclination and disability is essential for understanding other cognitive traits associated with autism, which may reflect variations in inclination rather than deficits in ability. Therefore, focusing on Local and Global Aspects of Stimuli, Attending Global Information and Responding, Associated Motivational Differences – Disinclination Vs Disability, and Cognitive Inclinations do form yet another 'Intricacy Zone'.

Furthermore, a study by Richard, A E., and Lajiness-O'Neill, Renee (2015) found that individuals with ASD and neurotypical individuals experience similar costs related to attention shifting, as evidenced by differences in reaction times (RT) between trials requiring shifting and those that do not, at both preattentional and focused attention levels. This pioneering research demonstrates that individuals with ASD do not incur greater costs in adjusting their attentional focus compared to their neurotypical counterparts. Therefore, Attention shifting and Reaction Time, Preattentional Attention Level and Focused Attention Level, all form an 'Intricacy Zone'.

Children who could maintain their focus for extended periods exhibited superior expressive language skills (Howard, J., Herold, B., and Major, S et.al 2023). These findings indicate that executive function and attention capabilities may significantly influence various areas of functioning in children with autism. Experiencing inadequate attention can result in deficient sensory processing abilities, which in turn exacerbate limited social responsiveness (Crasta, J. E., Green, O. J., Gavin, W. J., and Davies, P. L. 2024). Therefore, Language skill, Executive Function, Attention, Resulting Sensory Processing abilities and Resultant Social responsiveness all form another 'Intricacy Zone'.

Therefore, generalized difficulty in disengaging attention, intrinsic interest enhances attentional flexibility, IQ impacts attentional disengagement, struggle to shift attention to peripheral stimuli lacking inherent interest - indicating a broader attentional challenge, all form additional 'Intricacy Zone'.

Fischer, J., Koldewyn, K., Jiang, Y. V., and Kanwisher, N. 2014) explored two critical aspects of attentional function often linked to autism: attentional disengagement and social orienting. These aspects have been proposed as potential deficits contributing to core characteristics of autism, such as restricted interests and difficulties in social cognition. However, their findings highlight the complexity that high-functioning children with ASD do not demonstrate impairments in either attentional disengagement or social orienting, as assessed through saccadic eye movements.

Deficits in attentional function are the primary cause of autism. Instead, the central issue in autism may lie in domain-specific impairments in social cognition (Leekam S. 2016). Social deficits emerge early in development among individuals with autism and causally contribute to the manifestation of other characteristics associated with the autism phenotype (Strathearn L. (2009; Frye, R.E 2018)

Advanced cognitive functions, including intelligence, ought to be considered when defining attention within the autistic community in academic studies (Tullo, D., Levy, B., Faubert, J. et al 2024). These results underscore the necessity of factoring in cognitive proficiency when evaluating attentional skills in individuals with autism, as this may have considerable consequences for clinical assessment, intervention, and assistance.

Attentional Disengagement, Social Orienting, Social Cognition, Domain-specific Impairments in Social Cognition, Characteristics associated with these and Autistic phenotype, Intelligence – all in addition to therapeutic directions also serve essential 'Intricacy Zone'.

Increased focus on social events was associated with improved language skills for both groups and reduced symptom severity in children with Autism Spectrum Disorder (ASD) (Todd, J. T., and Bahrick, L. E. 2023). Additionally, distinct pathways linking attention to language were observed in children with ASD compared to control groups, and therefore viewed by current author as an 'Intricacy Zone'.

This underscores the necessity for a new conceptual framework, 'Behavioural Intricacy Analysis' and "Intricacies Behavioural Modification," which emphasizes the complexity of behavioural modification beyond traditional methodologies, focusing on the nuanced interplay between attention processes and social functioning.

5. Behavioural Intricacies Analysis (BIA): A Professional Framework for Developmental Assessment and Intervention

The Behavioural Intricacies Analysis (BIA) framework is a structured, domain-sensitive methodology for identifying, categorising, and interpreting the nuanced, interdependent behavioural elements that underlie developmental functioning in children. Unlike conventional behavioural checklists or milestone-based assessments, BIA does not compress complex behaviours into oversimplified categories for the sake of clinical convenience. Instead, it maintains the fidelity of intricate behavioural patterns, recognising that oversimplification can risk the integrity of assessment and ultimately compromise the therapeutic outcome—particularly in vulnerable paediatric populations.

The BIA framework rests on the premise that child development, especially in neurodiverse presentations, is shaped by the *configuration* of multiple interwoven factors rather than isolated symptom clusters. It captures subtle interplay between domains such as social attention, emotional regulation, sensory integration, and cognitive sequencing, thereby providing a holistic and contextually relevant behavioural profile. This profile serves as the basis for designing tailored interventions that reflect the child's authentic developmental trajectory rather than a therapist's operational convenience.

Given its depth, precision, and reliance on clinically validated interpretive skills, the administration and interpretation of BIA require the advanced expertise of qualified psychologists. The competencies essential for its accurate application—such as nuanced behavioural coding, developmental psychopathology knowledge, and evidence-based intervention planning—fall squarely within the scope of professional psychological practice. Misapplication by inadequately trained personnel risks distorting the findings, leading to intervention plans that are misaligned with the child's actual needs, potentially causing long-term developmental setbacks.

BIA positions itself not as a tool for rapid screening, but as a framework that honours the complexity of child behaviour. It safeguards the child's right to an assessment process that is both scientifically robust and ethically accountable, ensuring that therapeutic decisions are guided by an authentic understanding of behavioural intricacies rather than by procedural shortcuts.

Rather than limiting observation to overt actions or milestone attainment, the BIA framework investigates *intricacies*—minute, context-sensitive behavioural features that reveal underlying cognitive, emotional, and social processes. These may include the rhythm, latency, and modulation of responses; the synchrony between verbal and non-verbal cues; the micro-adjustments in attention; and the adaptive or maladaptive configurations that emerge in dynamic environments.

The framework operates on three guiding principles:

1. **Contextual Embeddedness** – Every behaviour is analysed in relation to its situational, relational, and temporal context.

2. **Configurational Complexity** – Behavioural meaning emerges not from isolated elements but from the configuration and sequence of multiple subtle factors.

3. **Developmental Relevance** – Observed intricacies are interpreted with respect to the individual's developmental stage, neurocognitive profile, and potential for adaptive growth.

By capturing these fine-grained patterns, the BIA framework enables more precise behavioural profiling, fosters early detection of atypical trajectories, and informs the design of personalised intervention strategies. It holds applications in developmental psychology, clinical assessment, and therapeutic practice, offering a refined lens for understanding the complex architecture of human behaviour

Developmental Hierarchy

Development is structured on a hierarchy of **Social → Emotional → Cognitive** development, occuwith physical growth supporting social development.

- **Attention** starts as an outward reactive force, guided by early social interaction.
- Social deprivation can negatively affect emotional and cognitive growth.

Figure 1 Social–Emotional–Cognitive Development Hierarchy

Dimension	Behavioural Intricacy Analysis (BIA)	Developmental Systems Theory (DST)	Bronfenbrenner's Bioecological Model	Relational Developmental Systems (RDS)
Core Premise	Development = capacity to organize, link, and utilize ongoing bio-psycho changes as internal resources	Development emerges from dynamic co-action of multiple levels (genetic, neural, behavioural, ecological)	Development is shaped by nested environmental systems interacting over time	Emphasizes coaction between individual and context in dynamic relationships
View of Attention	A reactive, externalizing force triggered at birth and scaffolded by social input; precedes and shapes emotion/cognition	Attention emerges as one of many functions co-constructed through multilevel interactions	Attention is shaped by proximal processes within nested systems (e.g., microsystem)	Attention is a result of individual-context coactions, shaped by cultural and temporal factors
Role of Social Domain	Social development is the primary organizing domain, foundational to emotional and cognitive growth	Social and biological are equally interwoven, not hierarchically ordered	Social interactions occur within broader system structures (family, school, culture)	Social embeddedness is emphasized but not structurally primary
Hierarchical Structuring	Proposes a hierarchical development model: Social → Emotional → Cognitive, all underpinned by physical development	Emphasizes system interdependence over hierarchy	Focuses on ecological layering rather than a strict developmental hierarchy	Suggests development is mutually influential, not tiered
Origin of Developmental Force	Begins with sensory disruption at birth → generates attentional impulse guided by social context	Emphasizes internal and external coactions without prioritizing origin	Development originates in proximal processes within nested environments	No singular developmental "start point"; process is ongoing and reciprocal
Concept of Intricacy	Central: Intricacy refers to the infant's capacity to internally reorganize shifting elements into usable developmental resources	Complexity emphasized, but not defined in terms of "intricacy" as internal resource linking	Focus is more on structure and process than nuanced internal intricacy	Highlights complexity, but not through concept of intricacy as active reorganization
Key Reference(s)	Proposed by current author (2025)	Gottlieb, G. (1991). Epigenetic systems view of human development. *Developmental Psychology*, 27(1), 33–34.	Bronfenbrenner, U., & Morris, P. (2006). The bioecological model of human development. In Damon & Lerner (Eds.)	Overton, W. F. (2015). Processes of human development in RDS metatheory. In Lerner (Ed.), *Handbook of Child Psychology*

Figure 2 Basic Differences of Development Models

It is again different from Naturalistic Development Behavioural Interventions described by Schreibman, L., Dawson, G., and Stahmer, A. C et (2015).

	NDBI	**Behavioural Intricacy Analysis**
Unit of Analysis	Developmental skills and behaviour classes are evaluated based on functional engagement within natural contexts	Micro-behavioural intricacies are examined concerning their structure, frequency, interdependence, and contextual triggers
Analytical Approach	Strategy-oriented, integrating systematic instruction with spontaneous interactions to cultivate desired behaviours	Evidence-based analysis and interdisciplinary correlation of complexities, enabling interventions to be customized to the distinct complexity profile of every individual.
Adaptation Mechanism	Personalized goal establishment grounded in developmental preparedness and inherent learning prospects	Adaptive adjustment of intervention focuses in reaction to variations in complexity trends, potentially incorporating longitudinal monitoring

Scope of Contextual Factors	Concentrate on the immediate, daily surroundings to support the development of skills	Integrates various environmental factors—such as cultural, familial, and systemic contexts—that influence behavioural expression
Outcome Orientation	The attainment of developmental skills suitable for one's age and the achievement of functional independence	The diminishment of maladaptive complexity clusters and the enhancement of cross-domain behavioural coherence, with developmental improvements manifesting as a subsequent outcome

Intricacy Zones

Theoretical and empirical findings identify multiple "intricacy zones" (clusters of interconnected factors). Examples:

- Relational integration mechanisms, social comprehension, executive functions, symbolic representation.
- Interaction between genes and environment, selective perception, perceptual choice.
- Social communication and cerebellar network development.
- Early dissolution of temporary brain structures.
- Visual attention changes leading to altered experiences in synaptic pruning.
- Eye contact behaviour variations linked to social anxiety and autistic traits.
- Arousal and atypical connectivity in social cognition networks.
- Gestalt perception, global processing, and memory of socially significant stimuli.
- Biological motion perception and automatic dynamic attention.
- Local vs. global processing motivations.
- Attention shifting patterns and their link to language, sensory processing, and social responsiveness.

Behavioural Intricacies Analysis (BIA) Framework

BIA is a **domain-sensitive methodology** for identifying, categorising, and interpreting nuanced, interdependent behavioural elements. It avoids oversimplifying complex behaviours into therapist-friendly checklists.

Principles:

1. **Contextual Embeddedness** — Behaviour is analysed in situational, relational, and temporal context.
2. **Configurational Complexity** — Behavioural meaning emerges from the sequence and interplay of multiple subtle factors.

3. **Developmental Relevance** — Interpretation considers developmental stage, neurocognitive profile, and adaptive growth potential.

Concept	Operational Definition	Objective / Measurable Criteria
Behavioural Intricacies Analysis (BIA)	A structured, real-time observational method mapping micro-behaviours across social, emotional, and cognitive domains.	Minimum 15-minute observation; behaviours coded using BIA domain matrix; ≥ 90% inter-rater agreement required.
Intricacies Behavioural Modification	An intervention targeting specific maladaptive linkages identified in a BIA profile.	≥ 70% of intervention activities address coded maladaptive linkages; reduction in maladaptive frequency by ≥ 20% over a 4-week period.
Dynamic Observational Framework	A flexible protocol where observation focus shifts according to live behavioural responses.	Observer changes focus domain ≥ once every 5 minutes based on predefined triggers; all shifts logged with timestamps.
AIM–BIA Hybrid Scoring	Combined quantitative AIM scores with qualitative BIA intricacy codes for dual-profile output.	Each AIM item paired with at least 1 BIA code; composite score generated; scoring completion rate = 100% per session.
Social–Emotional–Cognitive Development Hierarchy	Developmental model in which social skills support emotional growth, which in turn supports cognitive development.	Higher-tier behaviours counted only if ≥ 50% of prerequisite lower-tier behaviours are observed in the same session.
Behavioural Configuration Factors	Patterns where two or more micro-behaviours from different domains occur in close temporal sequence.	Co-occurrence window = ≤ 10 seconds; pattern must appear ≥ 3 times per session to be coded.
Individualised Autism Profiling	Personalised behavioural map showing unique strengths, challenges, and linkages across domains.	Profile includes ≥ 1 linkage per domain from ≥ 2 observation sessions; stored in standardised profile template.
Real-time Behavioural Profiling	Live categorisation of behaviours into BIA domains during observation.	Behaviour logged within ≤ 10 seconds of occurrence; coding accuracy verified by second observer in ≥ 80% of cases.

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Figure 3 Important Concepts of the Intricacies of Behaviour Analysis Framework

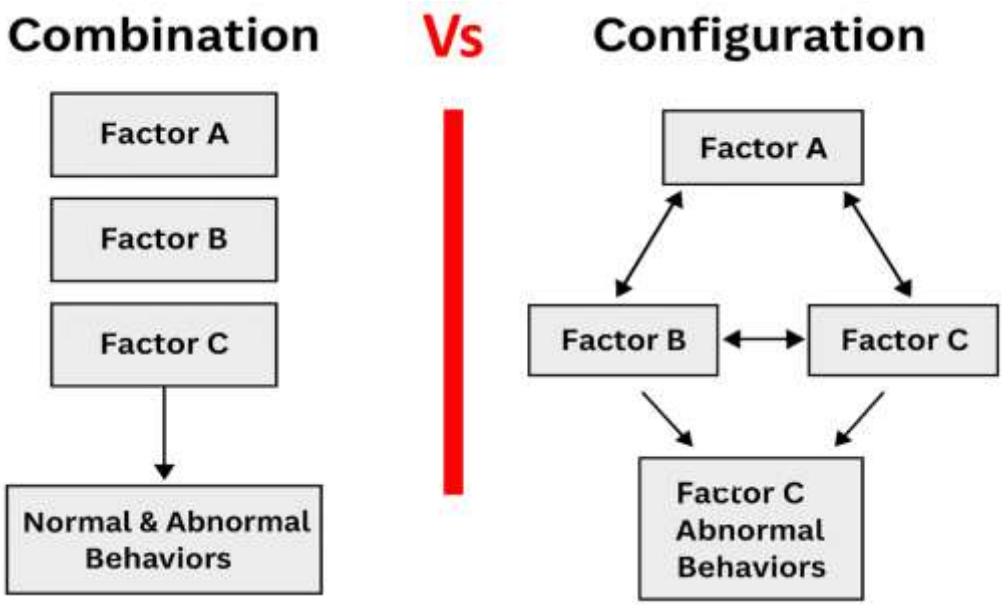

Figure 4 Schematic Diagram of Combination Vs Configuration of Factors

6. Discussion

It is widely accepted that current therapies do not fully meet the needs of autistic children, leading to prolonged treatment durations, especially in India. Early interventions can be effective, with behavioural therapies often outperforming occupational therapies.

The Behavioural Intricacies approach stresses multi-layered, context-dependent factors that shape human behaviour, contrasting with approaches that reduce behaviour to discrete, easily measured units. Oversimplification for the sake of therapist ease can dilute accuracy, depth, and personalised relevance — raising ethical concerns.

The BIA framework preserves complexity and contextual sensitivity, challenging models that prioritise convenience over ecological validity. This ensures interventions truly reflect the lived realities and developmental needs of individuals.

7. Utility and Implications

This framework:

- Offers a **probable alternative** to Applied Behaviour Analysis (ABA) and other autism therapies.
- Takes a **comprehensive** view of developmental interconnections.
- **Does not** simplify the complex nature of human ailments merely to suit therapist skill levels.
- Is the **first approach** to focus on modifying *intricacies* and *sub-configurations* rather than simple combinations of factors.

8. Limitations

- The scope and depth of intricacies are vast, and no single research or review can capture all
- The intricacies presented here are **not exhaustive** and must evolve with further research.

Is the first approach to focus on modifying intricacies and sub-configurations rather than simple combinations of factors.• The scope and depth of intricacies are vast, and no single research or review can capture all.

• The intricacies presented here are not exhaustive and must evolve with further research

9. References

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10. Appendices

Appendix A

Behavioural Intricacies to be Enquired

(Based on Behavioural Intricacies Analysis Model)

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This document outlines the key behavioural intricacies to be observed and enquired during an assessment based on the Behavioural Intricacies Analysis (BIA) model. It prioritizes real-time, dynamic understanding of how social, emotional, and cognitive developmental layers interact, rather than checklist-based milestones.

Social Attention Configuration

- How does the child initiate, maintain, or withdraw from shared attention?

- Are social cues (gaze, gesture, voice) processed as meaningful, or treated as background noise?

- Does the child link social attention with emotional response?

Emotional Modulation Loop

- How does the child modulate emotional responses when social input is received?

- What triggers overstimulation or emotional shutdown?

- Are emotional expressions used to communicate or to self-regulate?

Cognitive Alignment with Social Input

- Is cognitive interpretation aligned with social-emotional contexts?

- Does the child misread or skip steps in decoding intention or meaning?

- How much is the behaviour based on prediction versus reaction?

Temporal Shifts in Behavioural Prioritization

- What does the child prioritise in different settings — sensory input, social reward, task structure?

- How stable are those priorities across time?

- Can they shift priority based on situational demands?

Motor-Emotional Synchrony

- Are gestures and expressions in sync with emotional tone?

- Is there a breakdown between intent and motor execution (e.g. wants to respond but doesn't act)?

- Does physical behaviour lag behind emotional response?

Intricacy of Internal vs External Orientation

- Is the child more inwardly fixated or outwardly responsive?

- How do external stimuli impact internal processes (e.g. imagination, emotion, memory)?

- How does the internal state shape behaviour regardless of external demands?

Layered Dependency in Development

- Is social growth allowing emotional development, which in turn supports cognition?

- Are there breakdowns in these dependencies (e.g. cognitive overload without emotional readiness)?

- How does each layer support or hinder the others?

Configurational Rigidity vs Flexibility

- How rigid or fluid is the child's behavioural configuration across environments?

- Can they adapt when routines change or social expectations shift?

- Are certain configurations fixed due to past trauma or unmet developmental needs?

Feedback Loop Recognition

- Does the child perceive the consequences of their actions on others?

- Can they integrate social feedback into their next behaviour?

- Are they aware when a social loop is incomplete (e.g. not responding to greetings)?

Intrinsic vs Extrinsic Behavioural Drivers

- Is behaviour primarily driven by intrinsic motivation or external demands?

- Are actions performed for sensory relief, social gain, or emotional reassurance?

- What triggers spontaneous behaviour outside instruction?

Interference Between Developmental Tracks

- Is emotional dysregulation interfering with cognitive processing?

- Is physical discomfort blocking social engagement?

- Does overfocus in one domain block others (e.g. intense cognition undermining empathy)?

Other Intricacies

- Behaviour under ambiguity: How does the child respond when expectations are unclear?

- Transitions and state-switching: How do they move between tasks, roles, emotional states?

- Repair mechanisms: Does the child attempt to fix social breakdowns (e.g. reinitiating attention)?

Appendix B

List of Behavioural Intricacies Analyzed Based On Observed Intricacies in Appendix A

Zone	Usual Intricacies	Description
Zone 1: Input Processing	Sensory Filtering	Ability to filter relevant from irrelevant stimuli
	Auditory Load Response	Sensitivity to cumulative auditory input
	Visual Overload Reactions	Tolerance to light, motion, or clutter
	Tactile Intrusiveness	Reactivity to touch, texture, or pressure
	Proprioceptive Seeking	Craving for joint, muscle, or body-pressure input
Zone 2: Internal Regulatory Complexity	Arousal Modulation	Ability to regulate baseline alertness
	Sleep-Wake Pattern Impact	Effect of sleep cycles on function
	Hunger/Thirst Regulation	Behavioral shifts with interoceptive cues
	Emotion–Cognition Link	Co-variation of mood states with reasoning

Zone 3: Behavioral Output Control	Inhibitory Threshold	Capacity to delay or inhibit impulses
	Transition Resistance	Reactions to task shifts or novelty
	Behavioral Spillover	Overflow of affect or impulses into unrelated domains
	Stimulus-Stuck Reactions	Getting 'locked' on specific inputs
Zone 4: Cognitive Mediation of Behavior	Working Memory Fragility	Difficulty holding instructions while acting
	Instructional Fragmentation	Breakdown of multi-step command execution
	Task Generalization Barrier	Failure to apply learnt behavior across settings
	Abstract Mapping Lag	Delay in linking symbol to context
Zone 5: Social Signal Interpretation	Gaze Tracking Lag	Slowness or absence in joint attention
	Prosody Misattribution	Incorrect reading of emotional tone
	Gesture Context Decoding	Misreading social gestures or expressions
Zone 6: Environment–Behavior Feedback Loop	Behavior-Reinforcement Gap	Lack of linkage between behavior and feedback
	Situational Cue Blindness	Missing contextual hints for behavior shift
	Self-Monitoring Delay	Failure to evaluate and self-correct in real time
	Contingency Anticipation	Trouble predicting likely outcomes of behavior