THE ASIAN EDUCATIONAL THERAPIST

ISSN: 2972-4104, Volume 4, Issue 1, Page 23 - 29

REVIEW

Revisiting Drive Reduction Theory: Motivational Foundations and Therapeutic Implications for Autism Spectrum Disorder

Qunxi Lu

Educational-Therapist-in-Training, Merlion Academy

Article DOI: https://doi.org/10.64663/aet.70

Corresponding author's email: *lucylu.sg@hotmail.com*

***Cite as**: Lu, Qunxi (2026). Revisiting Drive Reduction Theory: Motivational Foundations and Therapeutic Implications for Autism Spectrum Disorder. The Asian Educational Therapist, 4(1), 23-29.*

ABSTRACT

This review article provides a short overview of Clark Hull's Drive Reduction Theory (DRT) with its equation, and its relevance to our current understanding of behavioral patterns in children with autism spectrum disorder (ASD). DRT proposes that conative behavior is motivated by the need to reduce the internal tension resulting from unmet physiological or psychological needs. Although contemporary frameworks, such as Self-Determination Theory and Expectancy-Value Theory, have expanded the motivational constructs, DRT remains valuable for its systematic and quantifiable approach. Applying DRT to ASD reveals that repetitive movements, sensory-seeking or sensory-avoidant behaviors, insistence on sameness, and engagement in restricted interests may function as drive-reducing strategies aimed at restoring homeostasis. This interpretation supports more empathetic and targeted intervention design. The paper has gone on to discuss briefly the varied therapeutic applications, including sensory-based strategies, structured routines, interest-based learning strategies, and family-centered approaches that leverage intrinsic motivational drives. Overall, DRT offers a useful theoretical bridge between classical motivation science and contemporary therapeutic practice for children with ASD.

Keywords: *Autism Spectrum Disorder, Drive Reduction Theory, Motivation, Sensory Processing, Therapeutic Interventions*

1. INTRODUCTION: REVISITING A CLASSIC THEORY FOR A MODERN CHALLENGE

Clark Hull's Drive Reduction Theory (DRT) first introduced in 1943 (Hull, 1943) has been considered a classic today because it provided one of the first systematic and scientific models of motivation, establishing a framework in which physiological needs create internal drives that motivate behavior (Webster & Coleman, 1992). In addition, the DRT explains how drive reduction serves as reinforcement,

i.e., a structure that continues to shape modern discussions of motivation and habit formation (Stults-Kolehmainen, 2023). Its legacy is also evident in contemporary computational and reinforcement-learning research, where homeostatic regulation and biologically grounded reward systems are modeled using principles directly traceable to Hull's original formulations, demonstrating ongoing theoretical relevance (Laurencon et al., 2024). Moreover, literature in modern education and psychology still presents Hull's DRT as a cornerstone of behaviorism, underscoring its foundational role in explaining basic motivated behaviors and its enduring value as an introductory framework in motivation science (Psychologs Magazine, 2024).

In other words, DRT posits that motivation arises from bio-psychological needs that generate an internal state of tension or *drive* as Hull (1943) termed it. According to the theory, the drive functions as a homeostatic mechanism, i.e., when a need is not fulfilled, the individual experiences discomfort that, in turn, excites the behaviors aimed at reducing that discomfort in order to restore the balance (Hull, 1943). For an example, when an individual is hungry, hunger would motivate them to eat. In the same way, a thirsty person, who has been wandering under the hot sun in a desert, thirst would motivate them to drink. Over time, these conative behaviors or conation[1] (see Chia, 2010; Poland, 1974), which is the behaviorist term used to refer to the aspect of human psychology concerned with desire, will, drive, intention, and goal-directed action, e.g., eating and drinking, will successfully reduce drives that are reinforced, creating a feedback loop that strengthens the likelihood of repeating such behaviors in similar contexts. Although contemporary motivation theories, e.g., the Self-Determination Theory (SDT; Deci & Ryan, 2000) and the Expectancy-Value Model (EVM) (Eccles & Wigfield, 2002), have expanded the understanding of human behavior to include cognitive, emotional, and social factors, Hull's DRT remains more valuable for its systematic and quantifiable approach, offering a structured lens for understanding complex behavioral patterns.

To better understand Hull's Drive Reduction Theory, Hull has proposed a complex formula to predict such a behavior as follows:

$$ {}_{s}E_{r} = V \times D \times K \times J \times {}_{s}H_{r} - {}_{s}I_{r} - I_{r} - {}_{s}O_{r} - {}_{s}L_{r} $$

where:

- ✓ ${}_{s}E_{r}$: Excitatory Potential. It refers to the likelihood of that an organism will produce a response (r) to a stimulus (s).
- ✓ V: Stimulus Intensity Dynamism. This means that some stimuli will have a greater influence than others.
- ✓ D_S: Drive Strength. This is determined by biological deprivation.
- ✓ K: Incentive Motivation. It refers to the size or magnitude of the goal.
- ✓ J: Lag/Gap of Time. It is the delay before the individual is allowed to seek reinforcement (R).
- ✓ ${}_{s}H_{r}$: Habit Strength. This is established by the amount of previous conditioning.
- ✓ ${}_{s}I_{r}$: Conditioned Inhibition. This is caused by a previous lack of reinforcement (R).
- ✓ I_r: Reactive Inhibition, or Fatigue.
- ✓ ${}_{s}O_{r}$: Random Error.
- ✓ ${}_{s}L_{r}$: Reaction Threshold. This is the smallest amount of reinforcement that will produce learning.

In the simplest form of Clark Hull's equation for DRT, it states that behavior strength is a function of habit strength multiplied by drive, often expressed as ${}_{s}E_{r} = {}_{s}H_{r} \times D$, meaning the likelihood of a response (r) increases when a learned habit activated by a stimulus (s), which is energized by a physiological need. Table 1 shows the description of each of the terms used in the DRT & its Equation and Table 2 presents three examples of drive reduction cycles.

[1] Conation is the part of mental life that gets you to *act*. It includes acts like making decisions and committing to them, persisting toward goals, having motivation or drive, exercising willpower, and taking initiative.

Table 1. Key Terms of DRT & its Equation

Term (Symbol)	Description
Drive (D)	This is a state of tension or arousal caused by a biological need (e.g., hunger, thirst, pain and/or sex). When a drive (D) is activated, it motivates the organism to engage in behavior that will reduce the drive and restore homeostasis.
Reinforcement (R)	The process of strengthening a behavior, making it more likely to occur in the future. In this theory, reinforcement (R) happens when a drive is reduced. E.g., eating food reduces the hunger drive, reinforcing the behavior of eating.
Homeostasis (H or ⇌)	The maintenance of a stable internal environment. In this theory, organisms are motivated to maintain homeostasis (H or ≒) by reducing drives. E.g., drinking water reduces the thirst drive to maintain homeostasis (H or ≒).
Primary Drive (D_1)	Innate drives essential for survival (e.g., hunger, thirst, pain, sex). Their strength is determined by the degree of biological need. The reduction of a primary drive (D_1) is reinforcing, which means that it makes the behavior more likely to occur in the future.
Secondary Drive (D_2)	Learned drives that are not essential for survival (e.g., drive for money, social status, power). They are acquired through association with primary drives. E.g., a child learns to associate money with buying food (reducing hunger). Money then becomes a secondary drive (D_2). The strength of a secondary drive is determined by the amount of reinforcement it has received. The more reinforcement a secondary drive (D_2) has received, the stronger it will be.
Drive Strength (D_S)	This explains why people are more motivated to reduce a strong drive (D_S) than a weak one. E.g., a very hungry person is more likely to eat than someone who is only slightly hungry.
Drive Reduction Gradient (D_{RV})	It refers to the principle that the strength of a drive (D) decreases as it is reduced. Motivation to perform a drive-reducing behavior is highest when the drive (D) is strongest and decreases as the drive is satisfied. It is often represented as a bell-shaped curve.

Table 2. Examples of the Drive Reduction Cycle

Example 1: Thirst	Example 2: Tiredness	Example 3: Boredom
Feel thirsty (drive) ↓ Drink water (behavior) ↓ Thirst is reduced ↓ Less likely to feel thirsty immediately after	Feel tired (drive) ↓ Go to sleep (behavior) ↓ Tiredness is reduced ↓ Less likely to feel tired immediately after	Feel bored (drive) ↓ Read a book (behavior) ↓ Boredom is reduced ↓ Less likely to feel bored immediately after

Children with ASD often display behaviors that, at first glance, may seem idiosyncratic or purposeless, including repetitive movements, intense focus on restricted interests, or avoidance of sensory stimuli (APA, 2022). These behaviors, however, can be reconceptualized as responses (r) to unmet drives (D) or discomforts. For example, repetitive movements or “stimming” may serve as a self-soothing mechanism to reduce anxiety or sensory over-stimulation, while insistence on sameness may alleviate cognitive tension caused by unpredictable environments (Baron-Cohen et al., 2009; Leekam et al., 2011). By interpreting such behaviors through the framework of DRT, educational therapists and clinicians can move beyond reactive or superficial behavioral management toward interventions that target the underlying motivational causes, creating opportunities for meaningful engagement and adaptive skill development. In this way, Hull’s theory offers a bridge between classical motivation research and contemporary applied practice, emphasizing the importance of addressing both physiological and psychological needs in children with ASD.

2. DRT IN PRACTICE: UNDERSTANDING BEHAVIORS OF CHILDREN WITH ASD

Applying Hull’s DRT to children with ASD offers a framework for understanding why certain behaviors persist despite appearing non-functional or disruptive. Hull (1943) reiterated that behaviors are strengthened when they successfully reduce internal tension, suggesting that repetitive or unusual

actions may serve as adaptive strategies to restore bio-psychological or physiological balance. In children with ASD, hand-flapping, rocking, or echolalia and other self-stimulatory behaviors (Chia, 2025a) can be conceptualized as drive-reducing responses to internal discomforts, including sensory overload, anxiety, or frustration (Leekam et al., 2011). Rather than dismissing these behaviors as purely maladaptive, educational and occupational therapists can recognize them as attempts to satisfy unmet needs, offering a pathway to more targeted and empathetic intervention.

Sensory processing differences, common among children with ASD, illustrate the practical utility of DRT (Chia, 2025b). Sensory over- or under-responsivity creates internal tension, prompting behaviors aimed at reducing discomfort (Tomchek & Dunn, 2007). For example, a child with ASD covering his/her ears in response to loud noises is engaging in a drive-reducing behavior that alleviates sensory distress. Similarly, seeking certain textures or movements (e.g., bouncing on a trampoline) can reduce tension or anxiety caused by sensory deprivation or an under-stimulated sensory system (Miller et al., 2007). Interventions that respect these sensory drives, rather than attempting to suppress them outright, can help children achieve homeostasis while simultaneously fostering adaptive skills.

Another critical application is in understanding insistence on sameness and adherence to routines. Children with ASD often experience anxiety when routines are disrupted, creating a strong internal drive for predictability (Baron-Cohen et al., 2009). Hull's DRT suggests that behaviors enforcing routine (e.g., rigid schedules or repetitive sequences of play) are strategies to reduce cognitive tension and maintain a sense of control. Recognizing this, occupational as well as educational therapists can design interventions that gradually expand flexibility while still acknowledging the needs of a child with ASD for predictable environments, thereby aligning therapeutic goals with intrinsic motivational drives (Rodgers et al., 2012).

Also, more importantly, intense engagement in specific interests or "special interests" may also be viewed through the DRT lens. Such hyper-focused behaviors (often observed in children with ASD) can reduce psychological tension by providing a structured and predictable context in which the child experiences mastery and competence (South et al., 2005). Educational or occupational therapists working with such children can leverage these interests to promote learning and social engagement, integrating motivation-based strategies that align with Hull's principle that behaviors reinforced by drive reduction are more likely to persist. In this way, DRT not only elucidates the underlying reasons for observable behaviors but also informs individualized, strength-based intervention approaches that respect the child's intrinsic motivations.

3. THERAPEUTIC APPLICATIONS: TRANSLATING DRT INTO PRACTICE

Clark Hull's DRT (Clark, 1943; Leeper, 1944) provides a framework for designing interventions that address the underlying motivational forces behind behaviors in children with ASD (Chia, 2025b). By recognizing behaviors as strategies for reducing internal drives (be they physiological, sensory, or psychological), educational therapists, occupational therapists and other clinicians can develop interventions that align with the child's intrinsic motivations rather than merely attempting to suppress challenging behaviors. This approach encourages a strengths-based, individualized model of therapy that fosters engagement and learning.

One practical application is in sensory-based interventions (Chia, 2010). Sensory processing differences in children with ASD can generate strong internal drives to seek or avoid specific stimuli (Tomchek & Dunn, 2007). For example, a child with ASD, who frequently rocks or flaps his/her hands, may be regulating arousal levels. Using DRT as a guide, both occupational and educational therapists can provide alternative activities that satisfy the same sensory drive in a safer or more socially adaptive manner. Occupational therapy strategies, such as sensory diets (Wang & Chia, 2025), weighted vests (Maula et al., 2024), or structured movement breaks (Laskowski, 2023), allow children to achieve

homeostatic balance while enhancing focus, attention, and engagement in educational tasks (Miller et al., 2007).

Although little has been researched on how DRT can help to reduce stereotypy in recent years, Wolpe's (1950) paper offers one such study. In applying DRT in the behavioral management of repetitive or restrictive behaviors, instead of viewing insistence on sameness or special interests as obstacles, educational and/or occupational therapists can use these behaviors as entry points for skill development. By embedding learning objectives or social skills training within the context of activities preferred by children with ASD, the drive for predictability and mastery is maintained, while expanding functional capacities (South et al., 2005). For instance, a child with ASD fascinated by or obsessed with trains can practice basic math skills (e.g., counting), reading, or social turn-taking using train-related materials, reducing anxiety and reinforcing engagement through drive satisfaction.

Emotional (affective) and cognitive regulation can also benefit from DRT-informed strategies. Anxiety, frustration, or over-stimulation creates internal drives that can lead to meltdowns or avoidance behaviors (Rodgers et al., 2012), and that can include pathological demand avoidance (Curtis & Izett, 2025). Interventions, e.g., structured coping routines, mindfulness exercises, or visual supports, can help children with ASD identify their internal drives and reduce tension in adaptive ways. Hull's drive-reduction model emphasizes that reinforcement occurs when behaviors successfully reduce drives. Thus, both educational and occupational therapists can reinforce adaptive self-regulation strategies by providing immediate, consistent support and feedback.

Finally, DRT can also inform collaborative and family-centered interventions. Understanding that behaviors arise from unmet drives encourages parents and caregivers to respond with empathy and consistency rather than punishment or coercion. Psychoeducation (Loi & Chia, 2025) for families can focus on identifying triggers, understanding the drives underlying behaviors, and implementing supportive strategies that maintain the child's sense of agency while promoting adaptive functioning (Koegel & Koegel, 2012). This alignment of intervention with intrinsic motivation enhances long-term outcomes, ensuring that strategies are not only effective but also sustainable across home and school environments.

By applying Drive Reduction Theory (DRT) in therapeutic contexts, both educational and occupational therapists can move beyond symptom management to address the root causes of behaviors, creating interventions that are both scientifically grounded and tailored to the unique profile of each child with ASD. This approach underscores the relevance of classical motivation theory in contemporary practice, bridging theory and application in meaningful ways for children with ASD.

4. CONCLUSION

Revisiting Hull's (1943) Drive Reduction Theory (DRT) had indeed provided a coherent and clinically meaningful framework for interpreting key behavioral and sensory characteristics observed in children with ASD. According to DRT (Hull, 1943), internal states of tension or disequilibrium motivate organisms to engage in behaviors that restore homeostasis. Contemporary sensory integration literature reinforces this view: Sensory modulation difficulties create chronic states of internal strain for many children with ASD, driving them to seek or avoid sensory experiences in an attempt to regulate arousal (Miller et al., 2007; Tomchek & Dunn, 2007). Likewise, repetitive behaviors (often misunderstood as meaningless or purposeless) can now be understood as functional self-regulatory mechanisms aimed at reducing anxiety or stabilizing sensory-perceptual overload (Rodgers et al., 2012; South et al., 2005).

For educational and/or occupational therapists, integrating DRT with current research highlights an essential therapeutic shift: from reducing "problem behaviors" to addressing the underlying drives that generate them. Interventions grounded in sensory-informed practice, co-regulation, environmental

structuring, and anxiety-sensitive instructional methods work not by suppressing outward behaviors but by decreasing the internal physiological and emotional pressures that give rise to them. In this way, the drive reduction becomes synonymous with restoring functional equilibrium. By synthesizing classic motivational theory with modern evidence on sensory processing and repetitive or self-stimulatory behaviors, DRT provides a valuable lens through which both educational and occupational therapists can design individualized interventions that enhance regulation, readiness to learn, and overall participation for children with ASD.

5. ACKNOWLEDGEMENT

None.

6. COMPETING INTERESTS

The author has declared that no competing interests exist.

7. FINANCIAL DISCLOSURE

Non funds obtained.

8. ARTIFICIAL INTELLIGENCE DISCLOSURE

No generative AI or AI-assisted technologies were used in the preparation of this manuscript.

REFERENCES

APA, American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders, 5th ed., text rev.* (DSM-5-TR). Washington, DC: The Author. https://doi.org/10.1176/appi.books.9780890425787

Baron-Cohen, S., Scott, F. J., Allison, C., Williams, J., Bolton, P., Matthews, F. E., & Brayne, C. (2009). Prevalence of autism-spectrum conditions: UK school-based population study. *The British Journal of Psychiatry*, *194*(6), 500-509. https://doi.org/10.1192/bjp.bp.108.059345

Chia, K. H. (2010). Basic learning and behavioral support activities for children with mild/moderate autism. In *Practical Tips for Teaching Children with Mild/Moderate Autism in Mainstream Schools* (Paper No. 3). Singapore: Cobee Publishing House. https://doi.org/10.5281/zenodo.17696791

Chia, K. H. (2025a). Reframing self-stimulating behaviors (SSBs): Understanding the concept of autotelic autism and supporting engagement in children with profound autism. *ISRG Journal of Clinical Medicine and Medical Research*, *2*(2), 39-47. https://doi.org/10.5281/ZENODO.15259266

Chia, K. H. (2025b). Applying matrix theory in Clark Hull's drive reduction theory to analyze learning processes and behavioral responses in educational therapy for students with special needs. *The Asian Educational Therapist*, *3*(2), 22-37. https://doi.org/10.64663/aet.55

Curtis, S., & Izett, E. (2025). The experience of mothers of autistic children with a pathological demand avoidance profile: An interpretative phenomenological analysis. *Discover Mental Health*, *5*(5). Article No. 76778. https://doi.org/10.1007/s44192-025-00127-3

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, *53*, 109-132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Hull, C. L. (1943). *Principles of behavior: An introduction to behavior theory*. Bloomington, IN: Appleton-Century. https://www.scirp.org/reference/referencespapers?referenceid=1871284

Koegel, R. L., & Koegel, L. K. (2012). *The pivotal response treatment model for autism*. Baltimore, MD: Paul H. Brookes Publishing. https://www.amazon.sg/Pivotal-Response-Treatments-Autism-Communication/dp/1557668191

Laskowski, C. (2023). *Integrating movement breaks to support developmental goals in early intervention: A method development* (Publication No. 737). Expressive Therapies Capstone Thesis. DigitalCommons@Lesley. https://digitalcommons.lesley.edu/expressive_theses/737

Laurencon, H., Bhargava, Y., Zantye, R., Ségerie, C.-R., Lussange, J., Baths, V., & Gutkin, B. (2024). *Continuous time continuous space homeostatic reinforcement learning (CTCS-HRRL): Towards biological self-autonomous agents*. arXiv. https://arxiv.org/abs/2401.08999

Leekam, S. R., Prior, M. R., & Uljarević, M. (2011). Restricted and repetitive behaviors in autism spectrum disorders: A review of research in the last decade. *Psychological Bulletin*, *137*(4), 562-593. https://doi.org/10.1037/a0023341

Leeper, R. (1944). Dr. Hull's principles of behavior. *The Pedagogical Seminary and Journal of Genetic Psychology*, 65(1), 3-52. https://doi.org/10.1080/08856559.1944.10533282

Loi, C. T. T., & Chia, K. H. (2025). Pediatric psychoeducation for parents of children with autism: Integrating family functioning and parenting interventions. *Asian Journal of Pediatric Research*, *15*(12), 16-34. https://doi.org/10.9734/ajpr/2025/v15i12492

Maula, M. I., Ammarullah, M. I., Nugwita, C. M., Faisal, M. S., Afif, I. Y., Husaini, F. A., Lamura, M. D. P., Jamari, J., & Winarni, T. I. (2024). Weighted vest combined with vibrotactile stimulations decrease the sympathetic activity: A repeated measures study. *Health Science Reports*, *7*(11), e70194. https://doi.org/10.1002/hsr2.70194

Miller, L. J., Anzalone, M. E., Lane, S. J., Cermak, S. A., & Osten, E. T. (2007). Concept evolution in sensory integration: A proposed nosology for diagnosis. *American Journal of Occupational Therapy*, *61*(2), 135-140. https://doi.org/10.5014/ajot.61.2.135

Poland, R. G. (1974). *Human experience: A psychology of growth*. Saint Louis, CO: C. V. Mosby. https://cir.nii.ac.jp/crid/1971149384743172515/holdings

Psychologs Magazine. (2024, January 20). *Hull's Drive Theory*. https://www.psychologs.com/hulls-drive-theory/

Rodgers, J., Glod, M., Connolly, B., & McConachie, H. (2012). The relationship between anxiety and repetitive behaviours in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *42*(11), 2404-2409. https://doi.org/10.1007/s10803-012-1531-y

South, M., Ozonoff, S., & McMahon, W. M. (2005). Repetitive behavior profiles in Asperger syndrome and high-functioning autism. *Journal of Autism and Developmental Disorders*, *35*(2), 145-158. https://doi.org/10.1007/s10803-004-1992-8

Stults-Kolehmainen, M. A. (2023). Humans have a basic physical and psychological need to move the body: Physical activity as a primary drive. *Frontiers in Psychology*, *14*, 1134049. https://doi.org/10.3389/fpsyg.2023.1134049

Tomchek, S. D., & Dunn, W. (2007). Sensory processing in children with and without autism: a comparative study using the short sensory profile. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association*, *61*(2), 190–200. https://doi.org/10.5014/ajot.61.2.190

Wang, Q., & Chia, K. H. (2025). Sensory diet interventions for children with autism: A structured approach to enhancing self-regulation and participation. *International Journal of Nursing and Health Research*, *7*(4), 90-94. https://doi.org/10.5281/zenodo.17712618

Webster, S., & Coleman, S. R. (1992). Contributions to the history of psychology: LXXXVI. Hull and his critics: The reception of Clark L. Hull's behavior theory, 1943-1960. *The Psychological Reports*, *70*(3_suppl), 1063-1071. https://doi.org/10.2466/pr0.1992.70.3c.1063

Wolpe, J. (1950). Need-reduction, drive-reduction, and reinforcement: A neurophysiological view. *Psychological Review, 57*(1), 19-26. https://doi.org/10.1037/h0055810