Review

Psikiyatride Güncel Yaklaşımlar-Current Approaches in Psychiatry 2026; 18(1):112-123

doi: 10.18863/pgy.1684161

The Dual Process Theory of Autism: A Narrative Review

Otizmde İkili Süreç Kuramı: Anlatımsal Bir Derleme

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ABSTRACT

The Dual Process Theory in Autism is a contemporary approach used to explain the cognitive processing styles of autistic individuals. The theory proposes that individuals rely on two distinct modes of processing: intuitive (Type I; fast and automatic) and reasoning-based (Type II; slow and analytical). It is suggested that, compared to their neurotypical peers, autistic individuals tend to engage less in intuitive processing and more in reasoning-based processing. This cognitive style has been associated with reduced susceptibility to common biases such as the framing effect, sunk cost fallacy, and conjunction fallacy. Some studies report that autistic individuals demonstrate superiority in logical consistency and produce fewer intuitive responses, whereas others have failed to confirm these differences or have presented contradictory findings. Although self-reports often indicate lower intuitive and higher reasoning tendencies, inconsistencies emerge when compared with performance-based measures. Moreover, issues such as the ecological validity of the tasks employed, the limitations of the samples, and insufficient control of cognitive abilities make the interpretation of existing evidence difficult. Nevertheless, the theory provides a framework for jointly considering both the strengths of autism in non-social domains and the difficulties experienced in social contexts. In particular, the lack of rapid intuitive processing in social interactions may exacerbate communication difficulties, while an analytic approach may offer advantages in structured environments. In conclusion, the Dual Process Theory in Autism offers a valuable framework for understanding autistic cognitive diversity. However, due to inconsistent and limited findings, broader research with higher ecological validity is needed. This approach has the potential to contribute significantly both to theoretical understanding and to the development of support strategies for autism.

Keywords: Autism spectrum disorder, dual-process theories, rationality, individual differences r

ÖZ

Otizmde İkili Süreç Kuramı, otistik bireylerin bilişsel işleme biçimlerini açıklamak için kullanılan çağdaş bir yaklaşımdır. Bu kuram, bireylerin sezgisel (Tip I; hızlı ve otomatik) ve muhakemeye dayalı (Tip II; yavaş ve analitik) olmak üzere iki farklı işlem biçimine başvurduğunu öne sürmektedir. Otistik bireylerin nörotipik akranlarına kıyasla sezgisel işleme daha az, muhakemeye dayalı işlemeye ise daha çok yöneldiği iddia edilmektedir. Bu bilişsel stil, çerçeveleme etkisi, batık maliyet yanlılığı ve birleşim yanılgısı gibi yaygın önyargılara karşı daha az duyarlılık göstermeleriyle ilişkilendirilmiştir. Bazı çalışmalar, otistik bireylerin mantıksal tutarlılıkta üstünlük sergilediğini ve daha az sezgisel yanıt verdiğini rapor ederken, diğerleri bu farklılıkları doğrulamamış veya çelişkili sonuçlar sunmuştur. Öz-bildirimler genellikle düşük sezgisel ve yüksek muhakemeci eğilimleri işaret etse de performansa dayalı ölçümlerle tutarsızlıklar dikkat çekmektedir. Ayrıca, kullanılan görevlerin ekolojik geçerliliği, örneklemlerin sınırlılığı ve bilişsel yetilerin yeterince kontrol edilmemesi, mevcut kanıtların yorumlanmasını zorlaştırmaktadır. Bununla birlikte, kuram otizmin sosyal olmayan alanlarda güçlü yönlerini ve sosyal bağlamlarda yaşanan zorlukları birlikte değerlendirmeye imkân tanımaktadır. Özellikle sosyal etkileşimlerde hızlı sezgisel işlem eksikliği, iletişim güçlüklerini artırabilirken, analitik düşünmeye dayalı yaklaşım yapılandırılmış ortamlarda avantaj sağlayabilmektedir. Sonuç olarak, Otizmde İkili Süreç Kuramı otistik bilişsel çeşitliliği anlamada değerli bir çerçeve sunmakta, ancak tutarsız ve sınırlı bulgular nedeniyle daha geniş, ekolojik geçerliliği yüksek araştırmalara ihtiyaç duyulmaktadır. Bu yaklaşım, hem kuramsal anlayışa hem de otizme yönelik destek stratejilerinin geliştirilmesine önemli katkılar sağlayabilir.

Anahtar sözcükler: Otizm spektrum bozukluğu, ikili süreç kuramları, rasyonalite, bireysel farklılıklar

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Received: 28.04.2025 | **Accepted:** 08.07.2025

Introduction

Autism spectrum disorder (ASD; hereinafter 'autism') is characterised by persistent difficulties in social communication and interaction, along with restricted and repetitive behaviours, interests, or activities (APA 2013). In alignment with the preferred terminology of the English-speaking autistic community (Keating et al. 2023) and to maintain consistency, this paper uses the terms 'autism,' 'autistic person/people,' 'non-autistic person/people,' and 'neurotypical person/people.' Although autistic people often report everyday decision-making difficulties (Luke et al. 2011), research has shown that they may outperform their neurotypical counterparts on certain reasoning and decision-making tasks, demonstrating greater logical consistency and reduced susceptibility to common cognitive biases, in a way which lends itself to the description enhanced rationality (Morsanyi and Byrne 2020, Rozenkrantz et al. 2021).

Dual-process theories of cognition offer a useful framework for understanding these patterns. These theories propose two cognitive systems: intuition (Type I; fast, automatic) and deliberation (Type II; slow, effortful) (Evans 2008, De Neys 2018). The ideas of intuitive and deliberative thinking were originally labelled to as 'System I' and 'System II' (Stanovich 1999), but more recent literature has adopted the terms 'Type I' and 'Type II' (Evans 2018). The Dual-Process Theory of Autism suggests that autistic people and those with high autistic traits tend to rely more on deliberative processing and less on intuitive processing compared to neurotypical people (Rozenkrantz et al. 2021). This style has been linked to lower engagement in common cognitive biases and a preference for reflective, analytic, and logical strategies.

Expanding the tools and techniques of reasoning research to clinical and sub-clinical populations may offer valuable insights into cognitive diversity. Dual-process theories have gained popularity in autism research, particularly for explaining a tendency toward deliberative over intuitive reasoning. This cognitive style may reduce vulnerability to biases like framing effects, sunk-cost fallacies, and the conjunction fallacy (De Martino et al. 2008, Ashwin and Brosnan 2019). Despite the limited empirical base, the Dual-Process Theory of Autism has become influential, appearing in reference texts, such as the Encyclopaedia of Autism Spectrum Disorders (Brosnan and Ashwin 2021).

Proponents argue that autistic people may show enhanced rationality, here the ability to make bias-free, objective decisions—particularly in contexts where emotional and social influences are minimized (Rozenkrantz et al. 2021). This may reflect reduced sensitivity to affective or reward-based cues, allowing for more consistent, analytical judgments. Yet this strength-oriented view can overlook difficulties autistic people face in dynamic social settings, where fast, intuitive responses are often expected (Rand 2016).

However, findings are mixed. While some studies support enhanced rationality in relation to autism and high autistic traits, some report null or inconsistent outcomes (Taylor et al. 2022, Morsanyi and Hamilton 2023, Bastan et al. 2024). This review synthesises supporting and contradictory evidence from studies using between-group designs (by comparing autistic and non-autistic participants) and correlational designs (by assessing the levels of autistic traits). Autistic traits refer to characteristics commonly associated with autism—such as differences in social communication, restricted interests, and preference for routines—which are continuously distributed across the general population (Baron-Cohen et al. 2001, Ruzich et al. 2015). This review first introduces dual-process theories as the theoretical framework, then presents empirical support for the Dual-Process Theory of Autism, followed by its limitations and inconsistencies. The review concludes with a broader discussion of reasoning in autism and outlines directions for future research.

An Overview of Dual-Process Theories

In many decision-making contexts, human beings tend to rely on immediate, accessible knowledge rather than systematically applying normative rules of reasoning—even when such rules are known or explicitly provided (Evans and Frankish 2009). This reliance might create a divergence between how human beings should reason and how they actually do. Although the specifics of Dual-Process Theories remain a topic of current debate (Osman 2004, De Neys 2018), these theories generally propose the existence of two kinds

of cognitive processing: a rapid, automatic form often referred to as 'intuition,' and a slower, more reflective process termed 'deliberation' (Sloman 1996, Kahneman 2011, Evans and Stanovich 2013).

In general terms, intuition refers to a rapid, automatic, and low-effort cognitive process that operates independently of higher-order cognitive capacities, such as working memory, but is highly sensitive to contextual factors (Evans and Stanovich 2013). This mode of processing is typically engaged in situations where human beings rely on experiential knowledge, such as making educated guesses or forming associations based on prior learning (Evans 2018). In contrast, deliberation is characterized as a slower, more effortful, and rule-based form of processing. It is closely associated with cognitive abilities like working memory capacity and tends to be less influenced by situational context (Evans and Stanovich 2013). Deliberative processing is typically employed during tasks which require abstract reasoning or complex problem-solving (Evans 2018). Dual-Process Theories have gained significant traction across multiple disciplines, including economics, psychology, and philosophy. These theories have been applied to a wide range of domains, such as reasoning (Sloman 1996) and theory of mind (Apperly and Butterfill 2009).

A significant body of empirical research supports the distinction between these two qualitatively different modes of information processing. Experimental paradigms frequently manipulate time constraints to investigate these processes. In speeded response tasks—where participants must answer under time pressure—people are more likely to rely on fast, intuitive processing, which often results in systematic cognitive biases (Roberts and Newton 2001, Evans and Curtis-Holmes 2005). Similarly, instructing participants to give a quick response has been shown to increase intuitive responses in conditional reasoning tasks (Schroyens et al. 2003). In contrast, encouraging participants to focus on the task, take their time, or engage in reflective thought enhances the likelihood of deliberative, analytical responses (Evans et al. 2010).

Theoretical models have examined the relationship between these two types of processing. Among these, the default-interventionist model (Evans 2007) posits that intuitive responses are generated automatically as a default, and may be overridden by deliberative reasoning when a conflict between belief-based intuition and logic is detected. According to this model, successful override requires sufficient cognitive capacity to recognize and resolve the conflict (Stanovich and West 2008). In this framework, intuitive processing is typically associated with belief-driven responses, while deliberation aligns with logic-based responses.

A widely used illustration of this distinction is the bat-and-ball problem, part of the Cognitive Reflection Test (CRT; Frederick 2005). The problem is as follows: A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost? The intuitive but incorrect answer—£0.10—is commonly given, as it arises quickly and without deliberation. However, this answer fails to satisfy the problem's conditions: if the ball costs £0.10, the bat would cost £1.10, leading to a total of £1.20. Therefore, the correct answer is £0.05, which requires overriding the initial intuitive response through deliberative reasoning. In a study by Pennycook et al. (2016), in which no choice options are provided, 64.9% of undergraduate students gave the intuitive response, while 30.3% arrived at the correct answer, with only a small proportion offering other responses.

In addition to the bat-and-ball problem, other CRT items similarly reveal the tension between intuitive and deliberative thinking. For instance, a commonly used item states: "If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?" The intuitive answer is 100 minutes, yet the correct response is 5 minutes, as each machine independently produces one widget in 5 minutes (Frederick 2005). Another example involves a lily pad problem: "In a lake, a patch of lily pads doubles in size every day. If it takes 48 days for the patch to cover the entire lake, how long would it take to cover half the lake?" The intuitive response is 24 days, but the correct answer is 47 days, which is again requiring suppression of the first impulsive thought in favor of deliberate analysis (Toplak et al. 2011). These problems illustrate how CRT items function not merely as math puzzles but as diagnostic tools for assessing individual differences in cognitive reflection, actively engaging both intuitive and deliberative processing.

The CRT thus serves as a useful measure of an individual's propensity to engage in reflective thinking over intuitive responses (Toplak et al. 2014). Relatedly, people who tend to rely on intuitive processing are so-called associative thinkers, whereas those who habitually engage in reflective reasoning are deemed analytical thinkers. Further evidence supporting this distinction comes from studies linking the CRT performance to belief systems. For example, Pennycook et al. (2015) found that participants scoring higher on the CRT—indicating greater analytical thinking—were less likely to endorse religious and paranormal beliefs. However, contrasting findings by Howarth et al. (2016) suggest that even highly logical people may be susceptible to belief-based judgments when faced with belief-logic conflicts, highlighting the complexity of the interaction between intuition and deliberation.

Lastly, to further our understanding of the cognitive mechanisms underlying dual-process theories, neuroimaging studies have provided compelling evidence that intuitive and deliberative processes are associated with distinct neural substrates (but see Klein 2011). Functional magnetic resonance imaging (fMRI) data indicate that intuition is typically mediated by evolutionarily older, emotion-related or gist-based brain regions such as the amygdala, anterior insula, and ventromedial prefrontal cortex (Bechara et al. 2000). In contrast, deliberation is linked to higher-order executive areas including the dorsolateral prefrontal cortex (DLPFC), anterior cingulate cortex, and posterior parietal cortex (Greene et al. 2001, 2004, Kahneman 2011). Increased activation in the DLPFC during decision-making tasks has been interpreted as an indicator of the engagement of effortful, analytic reasoning strategies (Goel and Dolan 2003). These findings support the neurobiological validity of dual-process models, suggesting that cognitive operations are modulated by distinct brain systems.

While debates surrounding the merits and limitations of Dual-Process Theories have contributed significantly to our understanding of cognitive processing, their broader utility remains contested. De Neys (2021) argues that there is insufficient empirical or theoretical justification to decisively resolve the debate between single- and dual-process models. Moreover, De Neys (2021) contends that this theoretical divide may hold limited relevance for empirical researchers focused on observable cognitive phenomena.

Despite these critiques, many studies applying Dual-Process Theories into autism research have continued to rely on the dichotomy between intuitive and deliberative processing. Often, these studies implicitly endorse the default-interventionist model by associating deliberation with correct reasoning and intuition with error-prone judgments (Rozenkrantz et al. 2021). In line with this tradition, the current review adopts Dual-Process Theories as a general framework, with a particular emphasis on the default-interventionist perspective.

Evidence Supporting the Dual-Process Theory of Autism

This section reviews empirical research conducted over the past decade that links reasoning and decision-making in autism to the framework of Dual-Process Theories. Although the body of research remains relatively limited, the findings offer insights for cognitive characteristics associated with autism. Several studies have provided support for the Dual-Process Theory of Autism by showing that autistic people exhibit greater deliberation and/or lower intuition (Brosnan et al. 2016, 2017, Ashwin and Brosnan 2019). As an example, Brosnan et al. (2016) found that autistic participants gave fewer intuitive responses on the CRT, with no differences in deliberative responses, suggesting a specific reduction in intuitive thinking rather than a general increase in deliberation.

Some specific tasks have investigated autistic people's susceptibility to cognitive biases, including framing effects (De Martino et al. 2008), sunk-cost bias (Fujino et al. 2019), and jumping to conclusions (Brosnan et al. 2014). To measure jumping to conclusions, in the Beads Task (Huq et al. 1988), autistic participants typically asked for more information prior a decision, reflecting a more cautious decision-making style. However, conflicting results have also been reported (Jänsch and Hare 2014). Similarly, self-report tools, like the Rational-Experiential Inventory (REI; Epstein et al. 1996), have generally shown that autistic participants rate themselves as more deliberative and less intuitive than non-autistic participants. Still, self-report data are vulnerable to various biases, including differences in meta-cognition or social desirability effects (Doenyas et al. 2019, Bastan et al. 2024).

Studies using measures like the Autism Spectrum Quotient (AQ; Baron-Cohen et al. 2001) and the Subthreshold Autism Trait Questionnaire (SATQ; Kanne et al. 2012) have linked higher levels of self-reported autistic traits with greater deliberation and reduced intuition (Lewton et al. 2019, Georgiou et al. 2021). However, findings have not always been consistent, with some studies reporting no significant correlations, especially for deliberation (Taylor et al. 2022, Morsanyi and Hamilton 2023, Bastan et al. 2024).

Taken together, the Dual-Process Theory of Autism (Brosnan and Ashwin 2021) posits that autistic people and people with higher levels of autistic traits are more inclined to favour deliberative, analytical processing, while showing a relative reduction in intuitive, automatic responses. This cognitive profile contrasts with that of non-autistic people and those with fewer self-scored autistic traits, who tend to exhibit a more balanced or intuition-dominant processing style. This phenomenon—often referred to as enhanced rationality in autism (Rozenkrantz et al. 2021)—has been observed across various experimental paradigms and decision-making contexts.

This theory aligns closely with several established cognitive accounts of autism. For example, the enhanced perceptual functioning and systemizing theories (Baron-Cohen 2009, 2020, Baron-Cohen et al. 2009) emphasize heightened attention to detail and superior pattern recognition, both of which are conducive to deliberative reasoning. Similarly, the Weak Central Coherence theory (WCC; Happé 1999) describes an autistic cognitive style characterized by a focus on local rather than global information, which may favour rule-based, detail-oriented processing.

Empirical support for these associations includes findings by Brosnan et al. (2014), who observed a correlation in positive direction between autistic traits and a preference for deliberative reasoning strategies. Moreover, the tendency toward hyper-focus and literal interpretation in autism has been linked to logical processing and a potential difficulty in grasping overarching meaning or contextual cues (McCrory et al. 2007). This cognitive style may also contribute to the emergence of specialized abilities and savant-like talents observed in some autistic people (Happé and Vital 2009, Baron-Cohen 2020). Collectively, these findings provide preliminary support for the Dual-Process Theory of Autism, suggesting that individual differences in information processing preferences may underlie key cognitive features of the autistic profile.

One frequently cited example comes from studies utilizing the Beads Task, a probabilistic reasoning paradigm designed to assess data-gathering behaviour under uncertainty (Huq et al. 1988). In a study by Brosnan et al. (2014), autistic adolescents (N = 20; Mage = 14.60, SDage = 1.19) requested significantly more information (i.e., more beads) prior a decision than matched non-autistic control participants (N = 23; Mage = 14.35, SDage = 0.93). In this study, no participants reported having any co-existing conditions, such as ADHD. This cautious decision-making style suggests a reduced tendency to jump to conclusions; a common cognitive bias associated with making decisions based on insufficient evidence. A similar pattern was observed in non-clinical populations by Brosnan et al. (2013), where participants with higher levels of self-reported autistic traits also engaged in more extensive evidence gathering. These findings have been interpreted through the lens of systemising theory, which posits that autistic people exhibit heightened analytical abilities and a preference for rule-based reasoning, often in contrast to lower empathising tendencies.

Further support for enhanced deliberative reasoning in autism comes from studies employing objective cognitive measures such as the CRT, which evaluates an individual's ability to override intuitive but incorrect responses in favour of analytically derived answers. Several investigations have shown that autistic groups outperform non-autistic comparison groups on the CRT (Brosnan et al. 2016, 2017). In a study (Brosnan et al. 2016), autistic (N = 17; Mage = 18.4, SDage = 1.3) and non-autistic (N = 18; Mage = 19.5, SDage = 1.9) male adolescents were matched by age, while another study (Brosnan et al. 2017) included autistic (N = 26; Mage = 18.65, SDage = 1.85) and non-autistic (N = 22; Mage = 17.91, SDage = 0.29) young adults, with groups matched for gender and non-verbal intelligence, but not for age. Notably, in both studies, the autistic participants produced significantly fewer intuitive responses than the control group, although the frequency of deliberative responses was similar across groups. Importantly, these differences in reasoning styles were not attributable to general intelligence. After pooling data across

diagnostic groups and statistically controlling for age, gender, and diagnostic group membership, the authors found a significant positive correlation between self-reported autistic traits, as measured by the AQ, and the proportion of deliberative responses on the CRT.

A more recent investigation by Brosnan and Ashwin (2022b) further examined reasoning performance in autism using the CRT under varying time constraints. In this study, autistic (N = 71; Mage = 17.69, SDage = 1.01) and non-autistic (N = 132; Mage = 17.37, SDage = 1.26) late adolescents were matched on age and gender, but not on cognitive ability. Participants completed the CRT in both untimed and time pressure conditions. Across both conditions, autistic participants provided higher number of deliberative and lower number of intuitive responses compared to their non-autistic counterparts. Furthermore, a small but statistically significant positive correlation was observed between deliberative performance on the CRT and levels of self-reported autistic traits, as measured by the SATQ, after controlling for age, gender, diagnostic status, and time condition.

Reduced Engagement in Common Reasoning Biases

Beyond performance on tasks, additional research has indicated that autistic people and people with higher autistic traits may exhibit reduced susceptibility to common cognitive biases. For example, studies have reported that autistic participants are less affected by the framing effect—a bias where decision-making is influenced by the way options are presented, even when they are equivalent (De Martino et al. 2008, but see Levin et al. 2015, Shah et al. 2016). Similarly, reduced susceptibility to the conjunction fallacy has been found among autistic participants (Morsanyi et al. 2010). In the general population, Lewton et al. (2019) observed a negative correlation between belief bias and levels of autistic traits, suggesting reduced reliance on intuitive belief-based reasoning in people with higher levels of autistic traits.

These findings align with the broader characterisation of autism as involving cognitive strengths in non-social domains, such as analytical thinking and attention to detail, and challenges in social cognition (Baron-Cohen et al. 2011). The Dual-Process Theory of Autism helps to illuminate these domain-specific strengths and weaknesses. On the one hand, a reduced reliance on intuitive, belief-based reasoning allows autistic people to avoid some cognitive biases and base their judgments on logical, decontextualised analysis. This can confer advantages in structured, rule-based environments such as mathematics, computing, and data analysis, where objective, rational decision-making is beneficial (Rozenkrantz et al. 2021).

Enhanced Rationality and Navigating Social Domain

On the other hand, social interactions typically require fast, automatic processing of emotional and contextual cues. The inherently dynamic and unpredictable nature of social environments can pose challenges for people who primarily engage in deliberative reasoning strategies (Robic et al. 2015). This difficulty in rapid cue processing has been interpreted as a potential limitation in intuitive social cognition (Allman et al. 2005). Indeed, intuitive processing has been identified as critical in social decision-making contexts, where delayed reasoning may hinder effective interaction (Rand et al. 2012). Thus, while the Dual-Process Theory of Autism highlights a strength in deliberative reasoning and reduced bias susceptibility, it also underscores the importance of intuitive processing in everyday social functioning. A comprehensive understanding of cognitive processing in autism should therefore acknowledge both the benefits of enhanced rationality and the contexts in which intuitive processing is not only advantageous but necessary.

The rapid and automatic extraction of emotional and contextual cues from social domains is typically regarded as an intuitive process (Kahneman 2011). Challenges in intuitive reasoning and fast decision-making might contribute to the social communication difficulties often observed in autism. Brosnan and Ashwin (2021) note that autistic people may find it difficult to spontaneously adjust their conversational behaviour—such as changing the topic or ending a conversation—based on subtle social cues, like a partner's apparent disinterest or boredom. This reflects a broader difficulty in processing socially relevant information in real-time.

Collectively, these findings suggest that autistic people may either experience difficulties in engaging with intuitive processes or may simply rely on intuition less frequently. Brosnan and Ashwin (2021) proposed two possible explanations for this pattern: (1) intuitive processing may be impaired in autism, or (2) although intact, intuitive responses may be overridden by more frequent engagement in deliberative processing. This tendency could explain the longer decision-making times often reported by autistic people, particularly in social contexts (Luke et al. 2011). Nevertheless, it remains possible that autistic people can engage in fast and automatic processing in non-social contexts, where such reasoning may be more aligned with their cognitive strengths.

Supporting this perspective, Mendelson et al. (2016) proposed that slower information processing in dynamic social contexts, like initiating and maintaining friendships, might underlie some of the interpersonal challenges experienced by autistic people. These findings highlight the importance of examining reasoning and decision-making differences in both social and non-social contexts. A deeper understanding of these domain-specific cognitive processes can inform more targeted interventions to enhance social functioning and support autistic people in navigating complex social environments.

Limitations and Inconsistencies of the Dual-Process Theory of Autism

While several studies have suggested a tendency toward enhanced rationality in autistic people or people with higher levels of autistic traits, the empirical evidence remains mixed. For example, Brosnan et al. (2017) reported no significant differences between autistic and non-autistic comparison groups in the number of deliberative responses on the CRT. Similarly, differences in self-reported rational thinking—measured using the REI—were marginally significant between groups (Brosnan et al. 2016). These findings align well with earlier research by Morsanyi et al. (2010), which also failed to detect clear group differences in deliberative reasoning on heuristic tasks. Heuristics here are defined as cognitive short-cuts, which potentially leads to cognitive biases.

Several methodological issues complicate interpretation of this body of research. Many studies fail to adequately control for cognitive ability, which is a critical factor in reasoning and decision-making tasks. Findings that initially suggest greater deliberation in autism often become non-significant when intelligence is accounted for (Brosnan et al. 2017; Taylor et al. 2022). In addition, the common usage of the original CRT with only three items, now familiar to many participants, may undermine its validity. Recent studies using updated versions of the CRT have not replicated earlier findings on this task (Taylor et al. 2022, Bastan et al. 2024). Group matching also remains an issue, with some studies failing to adequately match participants on cognitive, demographic, or socio-economic variables, raising concerns about sample comparability. Furthermore, some tasks—like the Beads Task—have been criticized for their limited ecological validity and reliance on non-clinical samples (Westermann et al. 2012), which limits generalizability to autistic populations.

More recent investigations employing recent versions of the CRT have also failed to replicate earlier results. Taylor et al. (2022) used the CRT-7 (Sirota and Juanchich 2018) and tested a large general population sample. Their findings showed no significant relationship between CRT performance and levels of autistic traits, measured by the AQ, across several studies. Even the few statistically significant correlations observed—such as a weak positive association between deliberative responses and levels of autistic traits—disappeared after adjusting for age, gender, and cognitive ability. Furthermore, Bastan et al. (2024) employed the recently updated CRT, comparing autistic (N = 24; Mage = 37.46, SDage = 15.08) and non-autistic (N = 24; Mage = 37.83, SDage = 17.49) groups, which were matched well on age, gender and cognitive ability. While finding no significant difference on deliberative responding, contrary to previous findings, autistic sample scored more intuitively than non-autistic sample.

In a different study, Morsanyi and Hamilton (2023) employed a long version of the CRT with additional items and found no significant differences between autistic and non-autistic adolescents, as well as young adults. In their study, the groups were matched for demographic and cognitive variables. An exception in Morsanyi and Hamilton's (2023) study was the finding of a significant correlation between a sub-scale of the AQ—attention-to-detail—and deliberative responding among autistic adults—a pattern that, although

weaker, was also observed in the non-autistic adult group, suggesting the effect of age on reasoning, rather than diagnostic group. However, their sample was solely of university students, which limits the generalizability of the findings to the broader autistic community.

It has been shown that deliberative reasoning correlates strongly with general cognitive ability (Toplak et al. 2014). Accordingly, studies that matched groups on cognitive ability often failed to find robust differences in deliberative reasoning between autistic and non-autistic participants (Brosnan et al. 2017). Compounding this issue is ongoing debate over the validity of the CRT itself. Pennycook et al. (2016) argued that the CRT may better index an individual's disposition to engage in reflective thinking rather than their actual capacity for deliberation, and it may be more indicative of bias susceptibility than of intuitive reasoning per se. Additionally, the widespread exposure of CRT items through online platforms and popular media has raised concerns about participant familiarity, prompting updates to the task, such as the addition of new items by Sirota and Juanchich (2018).

Methodological limitations further complicate the interpretation of existing findings. Many studies have employed small sample sizes, which reduce statistical power and limit the reliability of their conclusions (De Martino et al. 2008). Moreover, the overreliance on homogeneous samples, predominantly composed of university students, undermines the representativeness of findings for autistic population (Hanel and Vione 2016). Since there is a replication crisis in some scientific fields, such as psychology (Tackett et al. 2019), future research should prioritize larger samples with more diversity—encompassing clinical, sub-clinical, and non-clinical populations—to robustly assess the validity of the Dual-Process Theory of Autism.

Despite the mixed results, a more consistent finding across studies is the self-reported reduced intuitive processing among autistic people. Several investigations have shown that autistic participants report significantly lower experientiality—interpreted as intuitive processing—than non-autistic participants (Levin et al. 2015, Brosnan et al. 2016, Taylor et al. 2022, Morsanyi and Hamilton 2023, Bastan et al. 2024). Yet, these studies generally found no significant differences between groups in self-scored rationality, which reflects deliberative reasoning. A recent narrative review by Van der Plas et al. (2023) synthesised studies for decision-making in autism and concluded that while perceptual and reward-based decision-making appears intact in autism, difficulties emerge in domains requiring meta-cognitive processing and subjective value assessments. These findings suggest that some observed decision-making differences may be better explained by meta-cognitive rather than purely cognitive factors.

Discussion

The Dual-Process Theory of Autism provides a promising lens through which to interpret individual differences in reasoning in autism. While there is evidence supporting this theory, particularly in relation to reduced intuitive processing and increased deliberative processing, the literature is marked by inconsistencies. Future research should prioritize better-controlled designs, more ecologically valid measures, and representative sampling to clarify the extent and nature of cognitive differences in autism. Notably, enhanced deliberation does not always equate to better decision-making; in real-world contexts, intuitive processing may be just as adaptive—and sometimes essential—for effective functioning.

The-Dual Process Theory of Autism (Brosnan and Ashwin 2021) presents a more modern, multi-dimensional, strength-focused framework that has obtained considerable attention in recent years. Unlike traditional models, this theory provides insights for the cognitive strengths and challenges faced by autistic people across both social and non-social realms. However, while the existing body of research supporting this theory is important, it remains limited and inconsistent (Taylor et al. 2022). If substantiated, this theory could enhance our understanding of autistic cognitive processes and inform the development of appropriate interventions, support systems, and policies. Conversely, if found to be inaccurate, it could contribute to misleading societal perceptions, and self-perceptions, of autism.

Given autism's high degree of heterogeneity and its complex, uni-dimensional cognitive accounts are inherently limited in scope. What is required is a broader, multi-dimensional framework that can capture the diversity of cognitive experiences within the autistic population and relate them to real-world

functioning. From this perspective, the Dual-Process Theory of Autism (Brosnan and Ashwin 2021) offers a promising, contemporary approach grounded in a strengths-based, multi-dimensional framework. This theory aims to address social and non-social cognitive differences observed between autistic and non-autistic people, as well as within individuals self-reporting varying autistic traits levels.

The consistent finding across the studies reviewed here regarding autism and autistic traits was that autistic participants self-score lower intuition. However, the discrepancy between their self-reports and objective task performance may reflect potential response biases or meta-cognitive difficulties, rather than a definitive difference in reasoning ability compared to non-autistic participants. The studies presented here align with recent research indicating that while some autistic people or people with higher autistic traits may demonstrate differences on certain rationality tasks—both subjective and objective—these effects are often inconsistent and marked by significant overlap with comparison groups. This suggests that while the Dual-Process Theory of Autism presents an intriguing framework, it likely does not capture a fundamental distinction between autistic and non-autistic cognitive styles. Future studies in the field should aim to include more ecologically valid tasks, consider individual differences, ensure representative sampling, and employ rigorous group matching when investigating reasoning and decision-making in autism and among people with high levels of autistic traits.

Conclusion

The Dual-Process Theory of Autism offers a compelling, strengths-oriented framework for understanding cognitive variability among autistic people and people with higher levels of autistic traits. While emerging evidence points toward distinct patterns in intuitive and deliberative processing, the current literature remains inconclusive and marked by significant methodological limitations. Future research should adopt more ecologically valid designs, account for individual and contextual variability, and avoid overgeneralization based on group-level differences. In this light, while the theory holds promise in advancing both scientific understanding and practical applications, its utility depends on continued empirical scrutiny grounded in inclusive and methodologically robust research.

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Authors Contributions: The author(s) have declared that they have made a significant scientific contribution to the study and have assisted in the preparation or revision of the manuscript
Peer-review: Externally peer-reviewed.
Ethical Approval: This review study does not require ethical clearance.
Conflict of Interest: No conflict of interest was declared.
Financial Disclosure: No financial support was declared for this study.
Acknowledgment: The author thanks William A. Sharp, scientifique collaborateur at the University of Geneva, for proofreading this manuscript and providing helpful language suggestions..