

### A predictive processing/active inference account of procrastination in the context of autism spectrum disorder (ASD)

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#### Introduction

"Executive function and social adjustment challenges make demands on our processing resource and interfere with our doing the things we do most sweetly" (8: 972).

A phenomenon often associated with autism spectrum disorder (ASD) is an atypical presentation in **executive functions** (7). Resulting difficulties with task initiation and task switching are referred to as **inertia** or, more colloquially, "**procrastination**" (9). This difficulty in getting started on or choosing the most urgent tasks, either by postponing working on the task or by performing other unrelated tasks before engaging in the original one, may be accompanied by physical and mental discomfort (2). Interestingly, however, it is also documented that once a task has been started, autistic persons may **focus** on it intensely and for prolonged periods of time, especially when the task is interesting to them (9). Autistic persons still suffer from persistent social **stigma** and high levels of unemployment, which may be further exacerbated by difficulties in executive functioning (5).

#### Methods

This study uses the **analytical methods of philosophy** to develop a framework to account for the relationship between deficits in **executive function, procrastination, and hyperfocus** in ASD (Fig. 1). The framework is based on the existing theories of predictive processing and active inference (1, 4, 6, 11, 12, 16).

Fig. 1: General predictive processing framework.

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#### Autistic traits contributing to procrastination-like behaviours

- 1) A **tendency to perceive small details** may lead to reduced awareness of the larger situational context, as proposed in the theory of weak central coherence (WCC) in ASD. Empirical studies yielded mixed results for WCC but confirm high detail perception in ASD (14). Though often beneficial to the individual (13), **high awareness of sub-tasks** can create overwhelm and delay task initiation.
- 1) **Sensory processing and the weighting of sensory cues** are frequently atypical and context dependent in ASD (11): High sensitivity to certain sensory inputs in a complex environment may create **sensory overload** and hamper focus on an individual task (12). Reduced sensitivity to environmental stimuli or immersion in a prior task can keep an individual from processing the necessary cues to engage in a new task. Especially with strong **monotropic interests** or phases of **hyperfocus**, switching from a task of current focus to a different one may be difficult (8).
- 1) The theory of high, inflexible priors of prediction errors in autism (**HIPPEA**) describes common autistic traits from the perspective of predictive processing (4). Sensory and social avoidance, reliance on routines, and reduction of novel stimuli help to construct a **predictable sensory niche**. For executive functioning, this may mean that both the **environment and the consequences of one's own actions are experienced as more unreliable** (12); the ability to choose the appropriate task for the desired outcome may thus be impaired (see Fig. 2). On the other hand, this tendency toward inflexible **routines** can also be beneficial, if recurring tasks and supporting structures are incorporated.
- 1) ASD frequently co-occurs with **other psychological and physical conditions** that may impair task selection and execution but should be considered separately. Examples include **ADHD**, where executive dysfunction is often linked to distractibility, forgetfulness, or difficulty in planning (15); generalized or social **anxiety disorders** may lead to perfectionism or fear of not executing the task in a satisfactory manner (2); **depression** may present as inertia and difficulty in task execution (10); **dyspraxia** can lead to difficulty in motor coordination necessary for task execution (17), or **hypermobility / EDS**, which may cause executive dysfunction due to pain and limited energy (3).

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#### Results

The relationship between executive function, procrastination, and hyperfocus in ASD is accounted for using a **predictive processing-based model**.

Task initiation and execution may thus be influenced by **sensory weighting, task salience, detail perception, and precision of prediction errors**.

It is proposed that autistic inertia is the outcome of **inefficiency in prediction-error minimizing processes**.

Fig. 2: Comparison of predictive processing in non-ASD and ASD.

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#### Discussion & Conclusions

Here, we explored autistic inertia based on existing theories of **predictive processing and active inference** (Figs. 1, 2), to highlight possible underlying factors and increase understanding of procrastination in the context of ASD. We propose that procrastination in ASD is the outcome of **inefficiency in prediction-error minimizing processes**, such as differential weighting of sensory stimuli. Our model is consistent with the theory of weak central coherence (WCC), i.e., or a tendency to focus on small details rather than the "big picture." Incorporating tasks into larger modules in the course of **routines, traditions and external structure** may be beneficial and help to alleviate stigma and negative social outcomes. ASD frequently co-occurs with **other psychological and physical conditions** that may likewise impair task selection and execution but should be considered separately from the framework proposed herein.

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