How do neurodivergent students learn at Imperial?

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Talking Teaching

Learning outcomes

- Gain awareness about neurodiversity
- Understand barriers faced by neurodivergent students
- Identify preconceived notions about different neurotypes
- Analyse what it means to be a student at university
- Discuss ways to make teaching and learning more inclusive

What are some expected characteristics of students at university?

Go to menti.com and enter code 5627 2071

Neurodiversity - Background

- **Neurodiversity** is based on the concept that neurological variations should be recognised and respected just like any other human variation, such as gender, race or sexual orientation

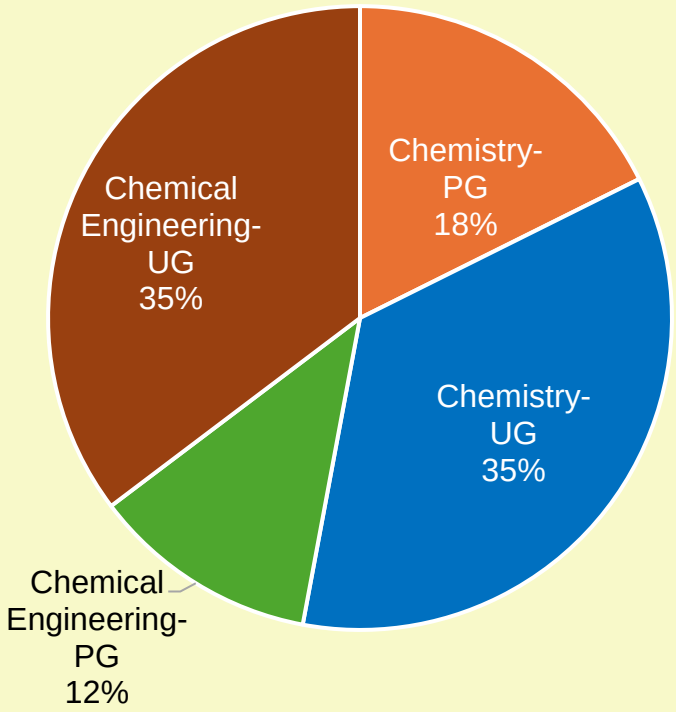
An estimated

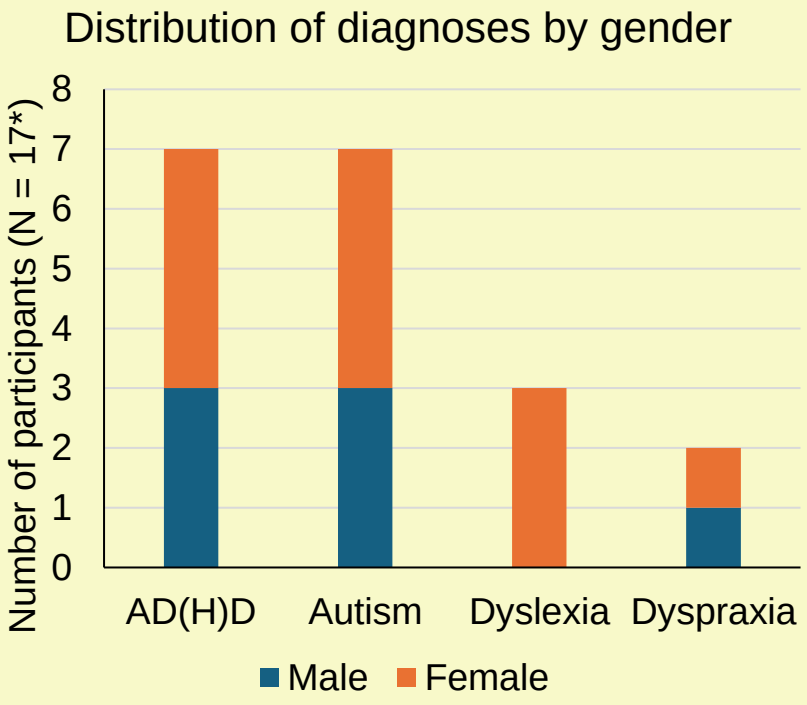
15-20%

of the population is considered neurodivergent.
(This includes ASD, ADHD, Dyslexia, Dyspraxia)

Study method and participant characteristics

- 17 students were interviewed.
- Offline answers to questions (3) or in-person/virtual interviews (14)





*13 confirmed, 4 self-diagnosed to be ND

Themes

Diagnosis / Screening

Neurodivergent traits

University Life

Recommendations

Understanding Neurodivergent Traits

Autism

- Differences in social communication and sensory processing
- **Strengths**: High attention to detail

ADHD

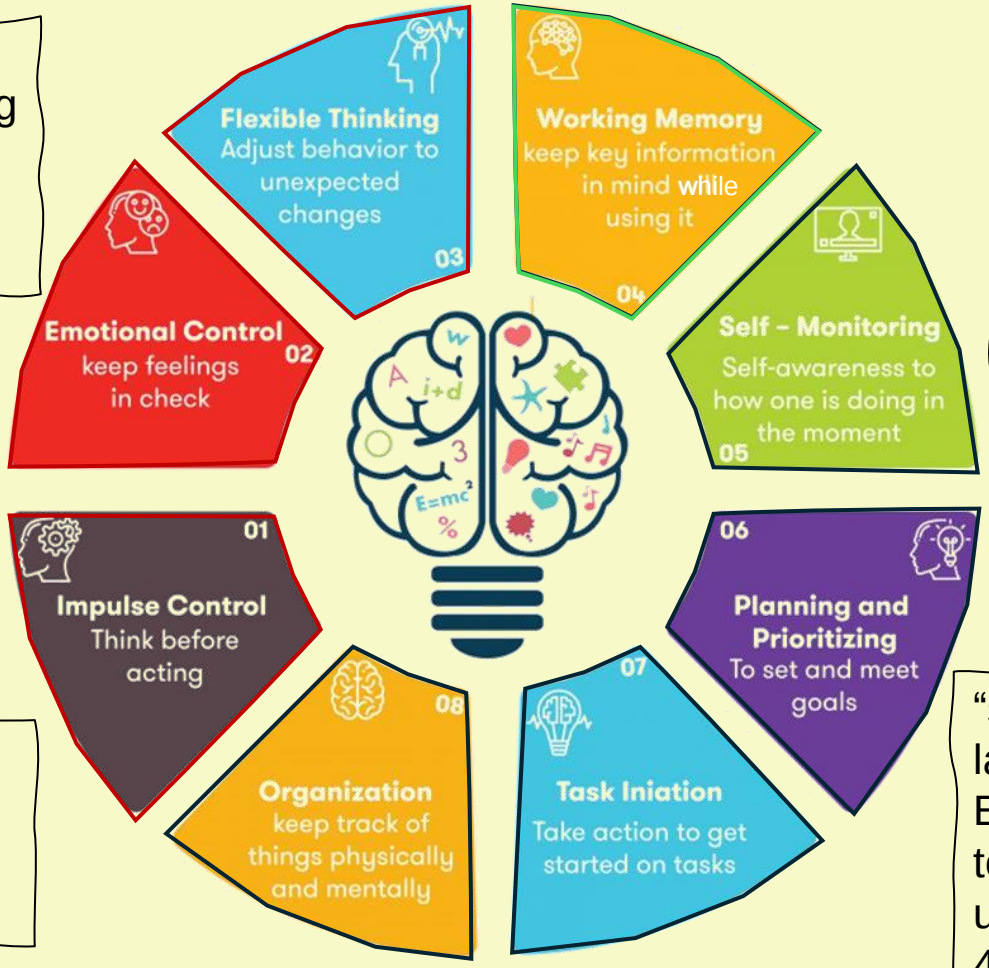
- Difficulties with organisation and time management
- **Strengths**: Creativity and ability to hyperfocus

Dyslexia

- Slower Information processing (verbal, reading, writing)
- **Strengths**: Strong problem-solving skills

Executive function varies by neurotypes

"I very strongly prefer routine / being able to anticipate things" – 5650 (Autism)



"I forget things I was told just seconds ago … I really find it hard to take in verbal information and process it in my head." – 8874 (Dyslexia)

"In a group scenario, I can't keep up." – 5332 (ADHD)

"poor time management and organization." – 5332 (ADHD)

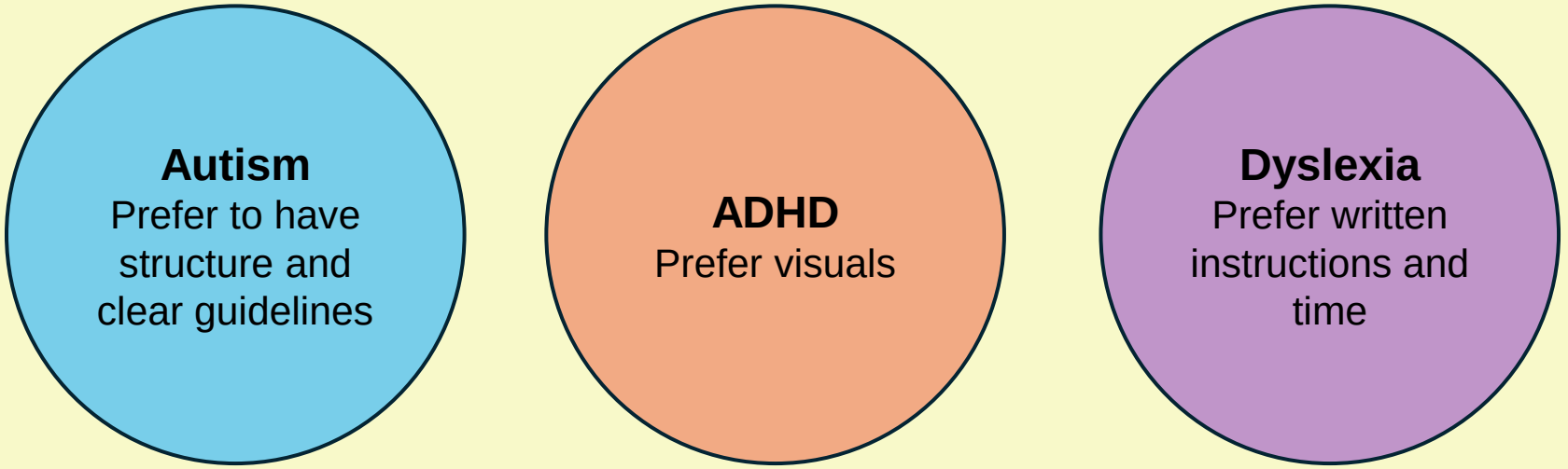
"slow/bad at reading (all languages – German, English, Russian). Have to reread often to really understand the text." – 4668 (ADHD)

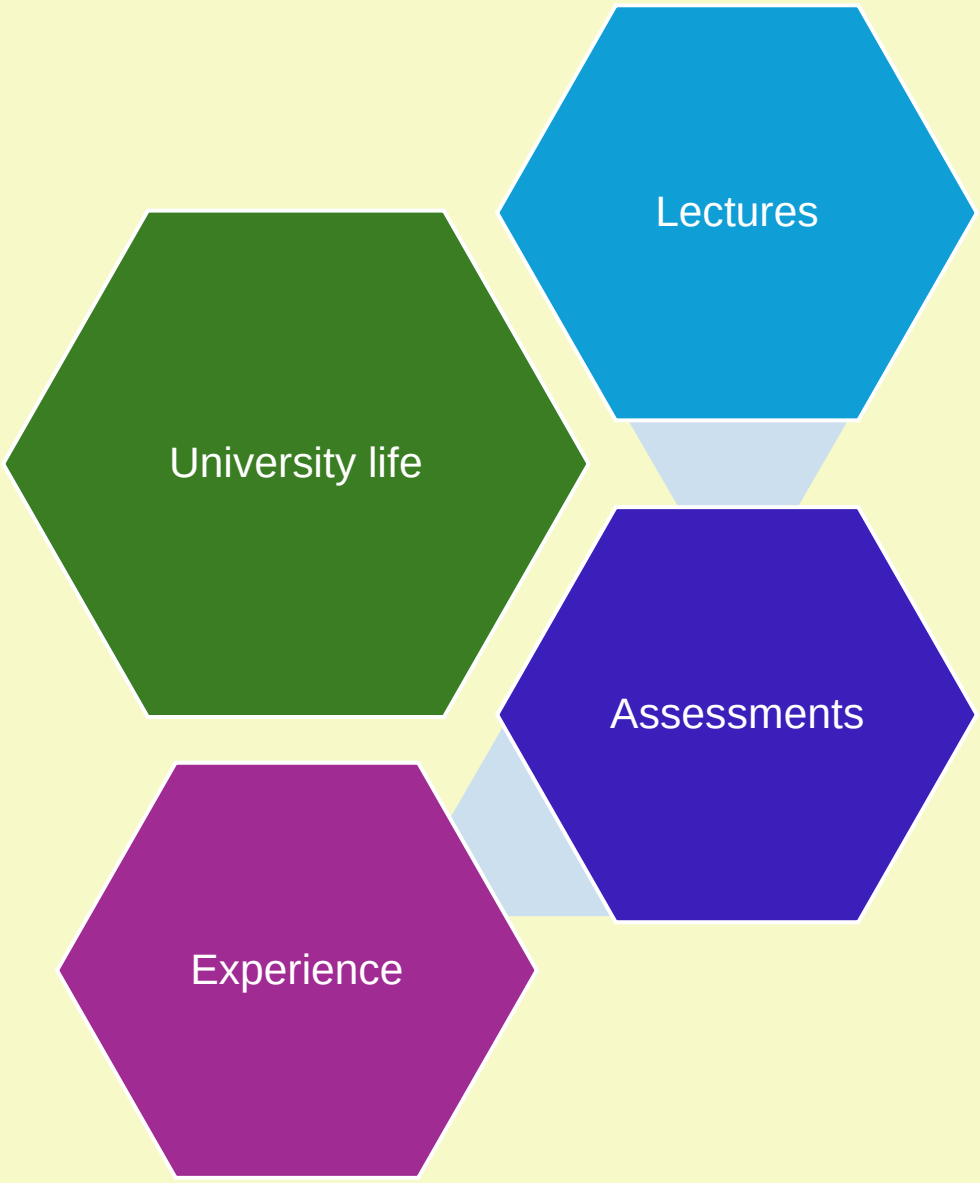
Image source: www.addvantageslearningcenter.com
Link: https://proactiveapproaches.co.uk/an-introductory-guide-to-executive-function-skills/

Challenges faced by ADHD students due to executive dysfunction

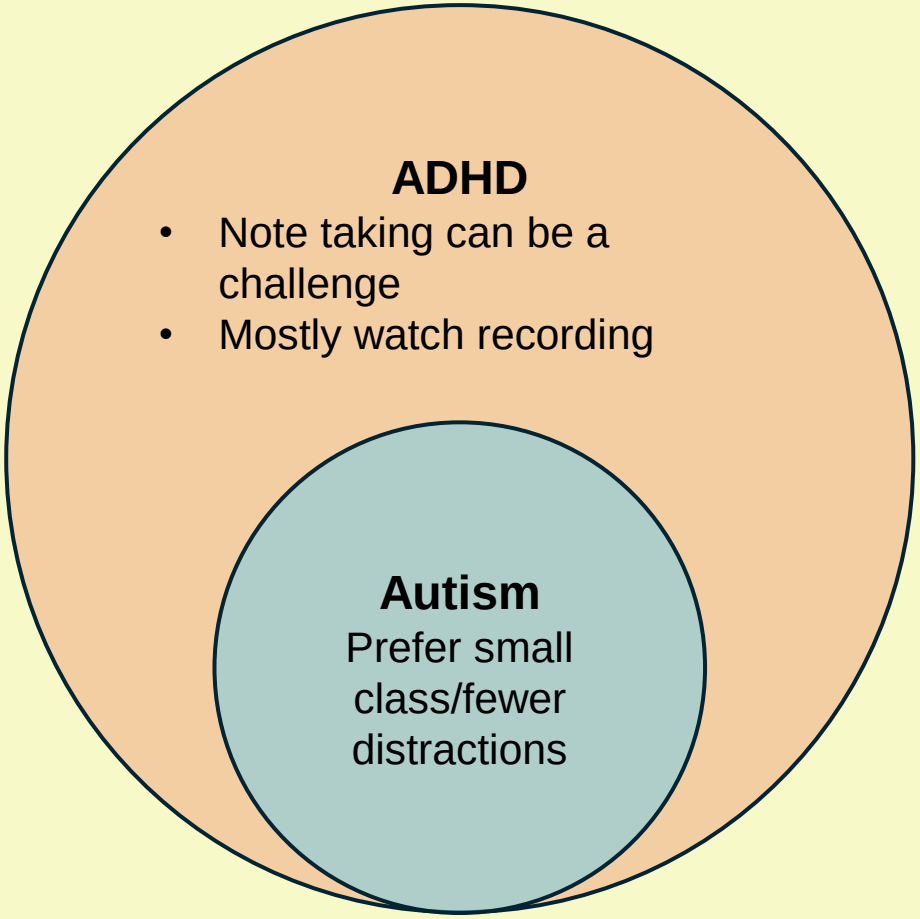
Organisation	Challenges in organizing materials, notes, and thoughts.
Working memory	Difficulty holding and manipulating information, impacting note-taking and recall.
Time Management	Difficulty estimating time, prioritizing tasks, meeting deadlines, and managing schedules.
Task initiation	Significant hurdles in starting tasks, leading to procrastination or "ADHD paralysis.“
Motivation	Challenges with internal drive, especially for tasks without immediate rewards.

Learning preferences vary by neurotype




Lectures
University life
Assessments
Experience

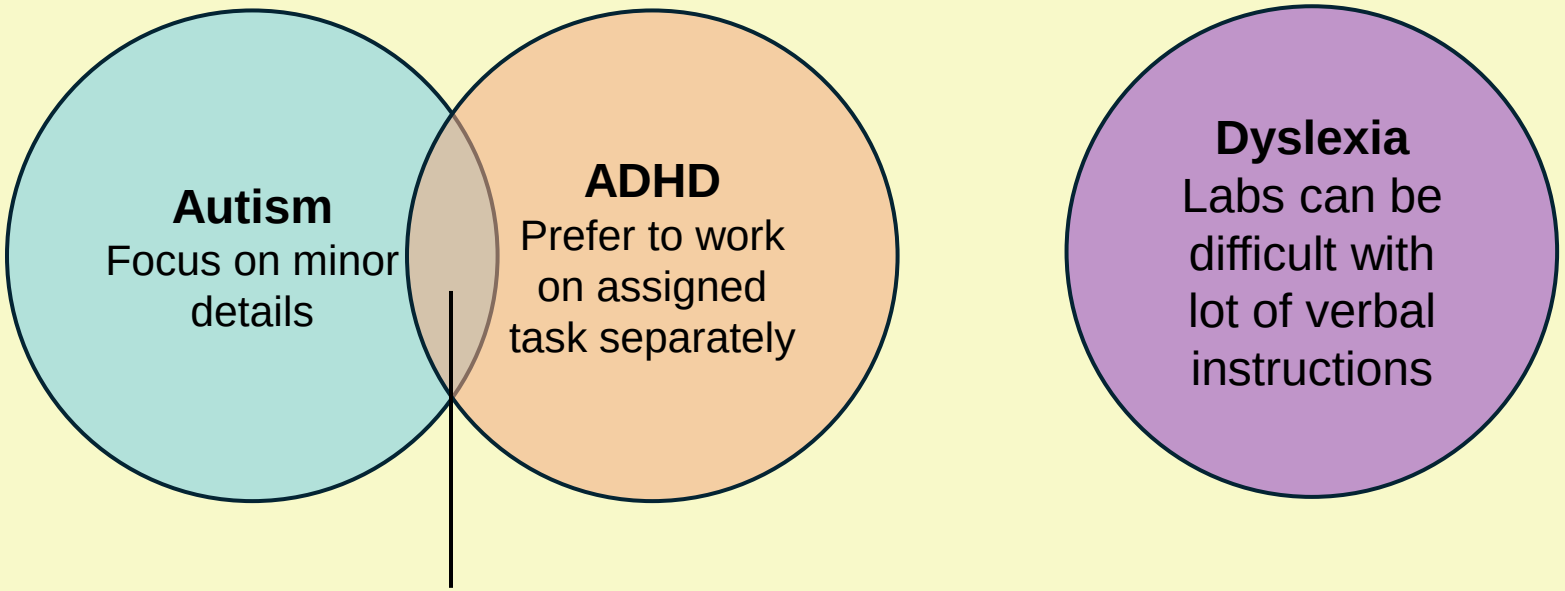
Engagement with lectures



"I have to go over things like three or four times like … it takes me 3 or 4 hours just to go over to one hour of a lecture." – 6696 (ADHD)

"I find it difficult to listen to the Professor talking and read the slides and, you know, some people in the audience are also talking. So, it's quite difficult to focus on one thing at a time.
Usually, I would go and try and listen some lecture at mostly and get the gist of it, and then I rewatch it and that's what I do." – 5930 (Autism)

Engagement in group activities for neurodivergent students

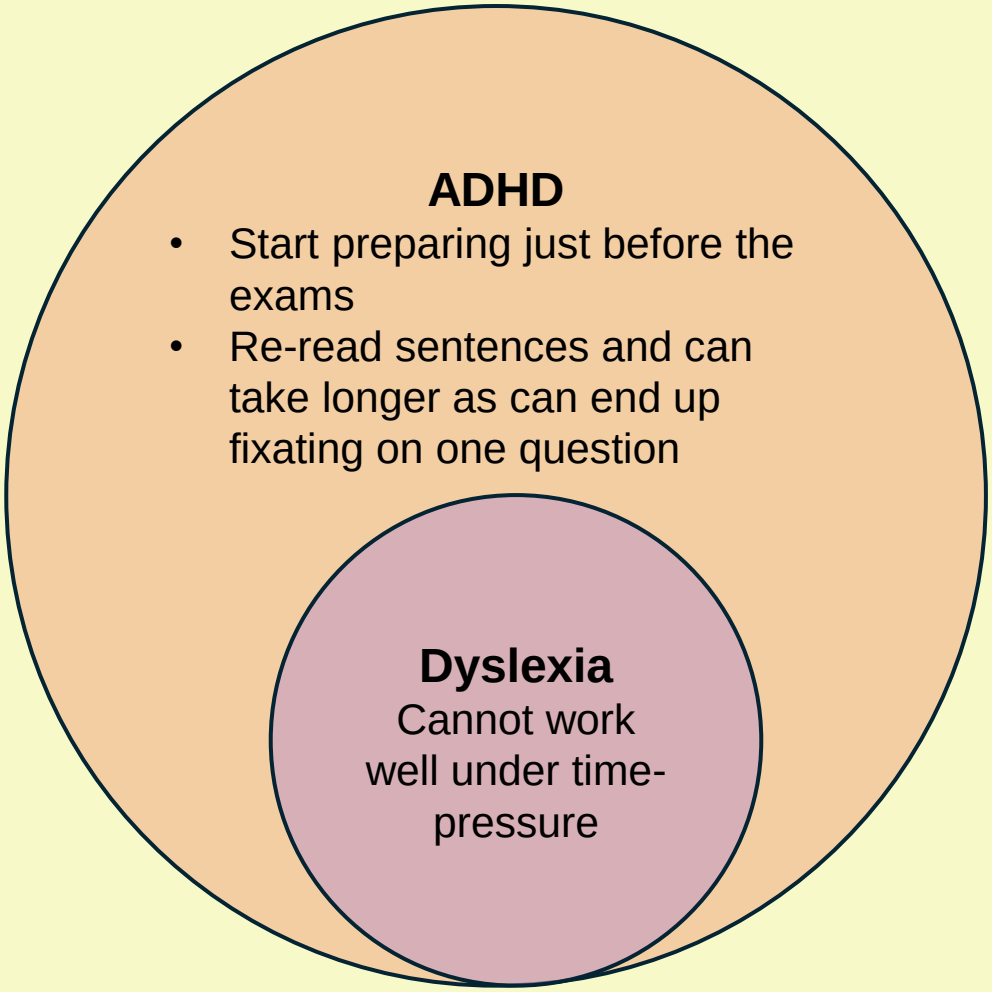


Working in large groups can be stressful

"it makes it difficult to focus when other people are talking. … it's overstimulating like it tires me down to be in the room with like 10 people." – 3076 (ADHD)

"when I do my labs, I annotate my lab script beforehand, so I know exactly what I am doing" – 2893 (Dyslexia)

Timed assessments do not represent student learning effectively



"I reread the question several times" – 3076 (ADHD)

"whenever I just look at an exam, it's like I've revised all of this, but I completely forget everything. So, it's like exam panic is like a big problem for me." – 6696 (ADHD)

"I found it really hard to process information under pressure even if it was questions that I would otherwise know how to answer" – 8874 (Dyslexia)

Problem-based learning can help with engaging with the content more deeply

“I feel like with courseworks, I have a bit more time to work on things as well and like it also means that since I have so much extra time that it takes into account that, I don't know, if a few days before the exams or like I had a really bad revision period, then it means that only during the Viva that I'm affected whereas the rest of my coursework I can still present in a way that is acceptable and will help me get through my degree.” – 6696 (ADHD)

“I really enjoyed the lab projects, because experimental research is one of my main interests and we worked in small groups.” – 1725 (Autism)

Constructivism and Neurodiversity

- Learners actively construct their own understanding and knowledge of the world. Constructivism supports this by encouraging student-led inquiry and hands-on learning, which can be particularly effective for students whose brains process information differently.
- It empowers neurodivergent learners to engage with content in a manner that aligns with their unique thinking styles, rather than a rigid, one-size-fits-all method. Students are given autonomy and opportunities to self-direct their learning paths.

- Piaget, J. (1964). Cognitive Development in Children: Development and Learning. Journal of Research in Science Teaching, 2, 176-186.
- Piaget, J. (1971). Biology and knowledge: An essay on the relations between organic regulations and cognitive processes. University of Chicago Press.

University experience at Imperial – 1st year

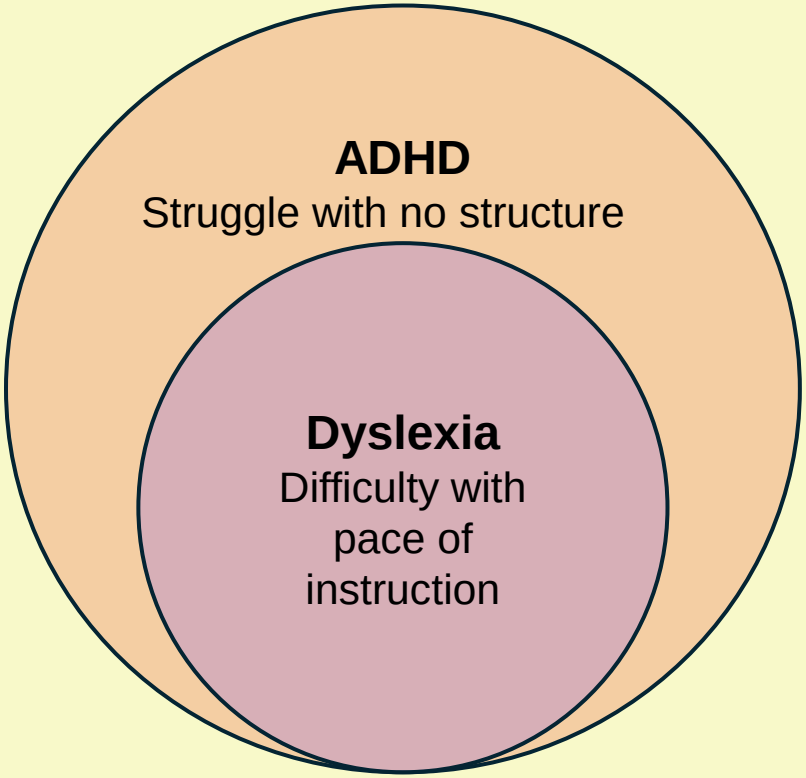
Autism

- Feeling of overwhelm
- Paperwork and settling in a new place can be challenging
- Higher recovery time and less time for self-study → more tired state

"Moving to a different country on my own, the difference in teaching style at university compared to school, and the large number of responsibilities from coursework to housework meant that I was tired most of the time and didn't have much time for hobbies." – 1725 (Autism)

"The first few weeks were overwhelming." – 3251 (Autism)

University experience at Imperial – 1st year



"Insanely stressful. … because I lacked the organization skills and the discipline to study every day. I ended up in these hyper focusing modes during exams that were like two months of exams." – 2648 (ADHD)

"I just was clueless in the first term." – 2893 (Dyslexia)

Recommendations: Sensory-friendly spaces

"Softer lights …more quiet spaces on campus … more awareness."
– 5650 (Autism)

- *Considerations*: Noise levels (e.g., quiet zones, noise-cancelling headphones), lighting (e.g., natural light, adjustable brightness, avoiding flickering fluorescents), temperature (some spaces can be too cold or too hot)

Cognitive Load Theory (CLT)

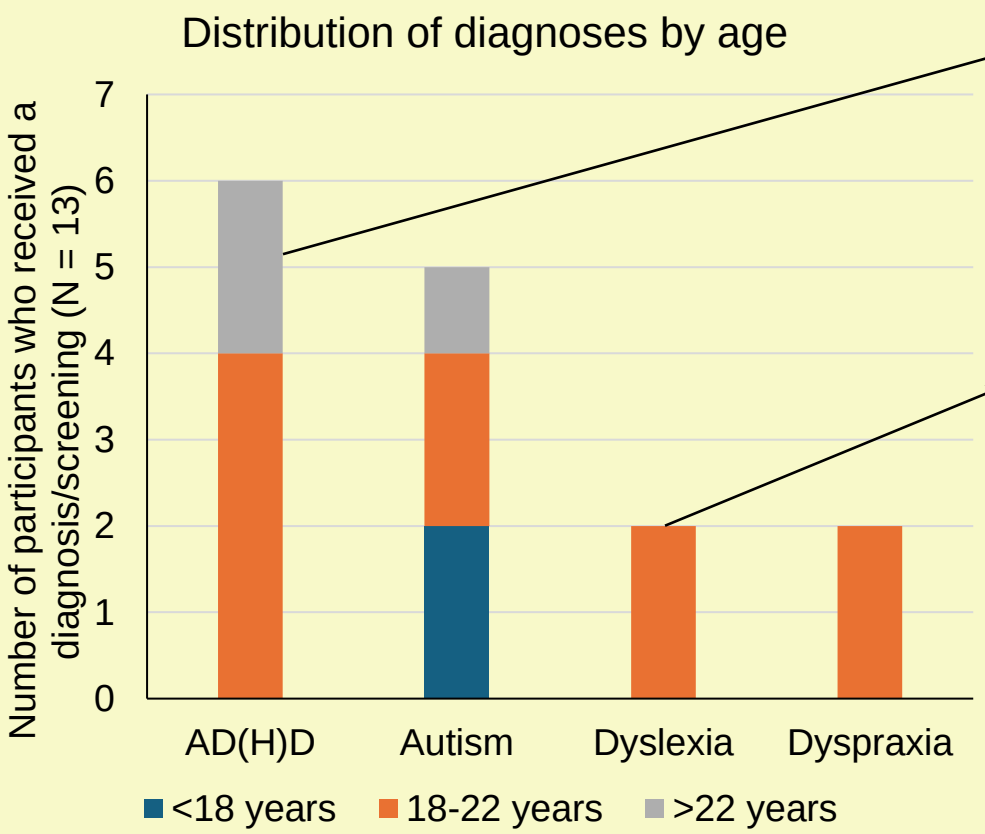
- CLT theory suggests that our working memory has a limited capacity for processing new information. Instruction should be designed to minimize extraneous cognitive load (unnecessary mental effort) and optimize germane cognitive load (effort related to learning and understanding).
- Many neurodivergent individuals, such as those with ADHD or certain autistic profiles, may experience differences in working memory capacity or heightened sensitivity to sensory input, leading to increased cognitive load.

- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257-285.
- Sweller, J., van Merriënboer, J. J. G., & Paas, F. (1998). Cognitive Architecture and Instructional Design. Educational Psychology Review, 10(3), 251-296.

What are some expectations from students?

Self-motivated	Differences in executive function can make it difficult to start a task
Ready-to-learn	Sensory sensitivities can affect learning
Naturally great at time management	Time perception and organisation can be neurologically different
Process information with ease, independent of format	Processing information can take longer or require different methods

Majority of students opted for screening at university



"in school, like got away with not doing much" – 4668

"in primary school I was offered intervention for English and not everyone had this opportunity, …I think it was helpful and I'm glad I got those support " – 2893

Support is available but not accessible to all neurodivergent students

- Majority students (15/17) were not aware about their neurotype before starting university
- Without support (mentors and/or accommodations), performance and mental health can be impacted
- The hidden nature can make it difficult to be self-aware and this can make it difficult to seek support

"I failed a lot of exams before I passed them and had panic before the exams." – 4668

Support is available but not for all types of assessments

Example adjustments* for neurodivergent (**diagnosed/screened**) students for timed summative exams

- Extra time
- Rest brakes
- Computer

*The implementation can vary across College and may not be relevant for the individual

- Group projects
- Presentations
- Field work
- Coding assignments
- OSCEs
- Essays

Universal Design for Learning (UDL)

- UDL is a framework for designing curricula that are accessible to all individuals from the outset.
- For example, providing information visually, audibly, and textually caters to varied processing strengths, while offering multiple ways to complete assignments allows students to leverage their strengths in expression.

- Rose, D. H., & Meyer, A. (2002). Teaching Every Student in the Digital Age: Universal Design for Learning. ASCD.
- Meyer, A., Rose, D. H., & Gordon, D. (2014). Universal Design for Learning: Theory and Practice. CAST Professional Publishing.

Key recommendations

- **Constructivism**: problem-based learning/projects
- **CLT**: simplify instructions, break down complex tasks into smaller chunks, reduce distractions, consider environment (e.g., lighting) when teaching, present information clearly, offer quiet sensory friendly spaces
- **UDL**: offer flexibility in content and assessments

Current work overview

Gathered assessment preferences from neurodivergent student and staff

- Help us understand why certain assessment types are preferred and what resources can be used to lower the perceived workload

Working with neurodivergent students to develop Inclusivity toolkit

- Recommendations for staff on how to design inclusive teaching and assessment by sharing lived experiences as well as exploring literature
- Recommendations for students on what to expect in an assessment and how to prepare for different skills being tested
- Recommendations for university on how to make systems and spaces more inclusive

Funding

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Questions?