

Thank you for listening to my keynote and for your positive feedback and very interesting questions. I have provided some responses below (red text). I hope these are helpful. I am very happy for people to contact me directly, if they have any further questions or comments: [j.vanherwegen@ucl.ac.uk](mailto:j.vanherwegen@ucl.ac.uk)

All the best,

Jo

Comment 1:

Thank you for sharing your research. I found it very interesting to learn that WS and DS show qualitatively different attentional processes during the given tasks. I wonder if we could find qualitative attentional differences within the neurotypical individuals. I would be interested to know if you have any empirical evidence with regards to the individual differences in neurotypical populations.

That is a very interesting question. We have some data on typically developing (TD) children aged 4 to 11 years old that shows that there were no changes in looking behaviours with chronological age within this age group. However, children produced longer fixations for easier ratios than harder ones, but there was no ratio effect for the number of fixations. In addition, looking patterns did not relate to task performance. These findings differ from those in TD adults. However, the study was underpowered and we need to collect more data. Yet, this will only be possible once children can come and visit the lab again post COVID.

As for the supporting environment for the children with developmental disorder, I agree with you in that designing affective environment based on the empirical evidence. I think this echoes with a recent movement of emphasis of STEM, which embraces “universal” aspect of environment. Also in STEM, attention has been given to Home math and Home science. I would like to share the Maths@HOME with early years practitioners in Japan.

Thank you. You can find all information about Maths@home on this website:

<https://www.ucl.ac.uk/ioe/departments-and-centres/departments/psychology-and-human-development/child-development-and-learning-difficulties-lab/educational-technologies-and-apps/mathshome>

Or <https://bit.ly/32QsOSm>

The survey on Home environment also showed very interesting results in that literacy related activities were recognized much more frequently than math activities at home. Do think this is inherent with cultural values in the UK, or is it difficult to have parents recognizing HOME math activities are ubiquitous? I wonder there may be cross-cultural differences that may be related to parental or societal emphasis on literacy or math. It would be interesting to know if such cultural differences may be one of the driving forces of creating home environments.

That is again a very interesting question. It is not easy to directly compare maths development across countries as we know that language (number names and counting system) as well as differences in the education system impact on mathematical outcomes. However, regardless of the culture, there are a few aspects that impact on mathematical outcomes, including parent’ academic expectations and attitudes as well as frequency of number activities. Indeed, a few studies have shown that Asian parents involve their children more frequently in computation activities compared to parents in Europe and North America. It has been as such suggested that the focus on literacy is a particular issue in Western cultures. There is a nice chapter by Jo-Anne

Lefevre (2016) who discusses these differences in more depth.

Comment 2:

I haven't studied numerical development so far, so I learned a lot for the first time and learned a lot. It is well understood that various factors are intricately intertwined in numerical development. It was fascinating that there were considerable differences in the determinants and consequences of numerical development between Williams Syndrome and Down Syndrome. I felt once again that neurodevelopmental disorders could not be grouped together. In Japan, there are arithmetic numerals (1234 ..... ) and Chinese numerals (1234 ..... ). However, the concept and cognition of numbers seem to be quite different depending on the language and culture. I would like to ask Dr. Herwegen what she thinks about the relationship between the concept of numbers by culture (language) and neurodevelopmental disorders. Thank you very much for your interesting presentation.

Thank you for this interesting question. Indeed, the language system plays a role in the development of mathematics as some counting systems are more transparent than others. Although this has been researched a lot in typically developing children, it is unclear how this may impact the mathematical development of children with neurodevelopmental disorders. However, I don't think the cultural differences would outweigh the individual differences and thus, individual differences in relation to for example overall ability, memory and executive functioning would still be a better predictor for outcomes than cultural differences. That is not to say that we shouldn't look into cross-cultural studies but for mathematical development these comparisons are tricky as differences in the language system, the educational system and individual differences all impact on mathematical outcomes. I would be very interested to explore cultural studies more if anyone is interested!

Comment 3:

Thank you for your wonderful talk! It was a great learning experience to hear the latest research on neurodevelopmental disorders. And I got some hints for educational practice. We usually use my numerical abilities in our daily life without being conscious of it. I realized that its development is essential. I was impressed that the difference in how to pay attention in the process of development between WS and DS.

I understood how studies examining development in neurodevelopmental disorders can further our understanding of how different cognitive abilities interact and shape cognitive development in both typical and atypical populations and what this might mean for interventions. I was impressed by the conclusion: Different interventions work for different children at different age groups.

Your talk in this keynote focused on WS and DS, but do you see different developments in mathematical abilities such as ASD?

Thank you for your question. Yes my PhD student Erica Ranzato is currently examining mathematical development in autistic children (comparing boys to girls as well as look at development). Unfortunately she had to pause her research because of COVID19 and school closures. However, her preliminary data suggests that many children with autism have mathematical learning difficulties and that there are a lot of individual differences. Erica hopes to collect data from enough participants in order to explore these differences.