

DYSLEXI

aktuellt om läs- och skrivsvårigheter

Årgång 11



Nr 3 - 2006

Tema räkneförmåga

Intervju med Brian Butterworth

Bodil Andersson, leg logoped, Lund/York



Foto: Bodil Andersson

Brian Butterworth är professor i kognitiv neuropsykologi vid University College, London, och specialist på de neuropsykologiska grunderna för matematiksvårigheter.

Professor Butterworth har lanserat en teori om dyskalkyli, som i stort går ut på att människor – och djur – föds med en numerisk förmåga; en förmåga att kunna känna igen och bearbeta "numerositeter" (ungefär: mängder med föremål). Denna numeriska förmåga gör att vi kan avgöra till exempel om en grupp om tre objekt innehåller färre eller fler objekt än en grupp om sju. Normalt kan djur och människor – även spädbarn – avgöra detta genom ett snabbt ögonkast. Men vissa människor måste räkna för att försäkra sig, ofta genom att räkna på fingrarna. Enligt professor Butterworth utgör normalt fungerande numerisk förmåga grunden för att förstå siffror och aritmetik.

Språk och numerisk förmåga utvecklas relativt oberoende av varandra, enligt professor Butterworth. Hjärnan bearbetar numerositeter i de sk intraparietala fälterna i båda hjärnhalvorna. Dyskalkyli ("developmental dyscalculia") definieras av professor Butterworth som specifika svårigheter med numerositet.

Professor Butterworth grundade 1993 facktidskriften "Mathematical Cognition" och han har skrivit flera böcker om dyskalkyli. En av dem finns på svenska och heter "Den matematiska människan". Han har också utvecklat ett datorbaserat screeningtest för dyskalkyli, "Dyscalculia Screener", som är standardiserat för barn 6-14 år och som används runt om i Storbritannien.

- Bodil Andersson från tidskriftskommittén träffade professor Butterworth i London i slutet av mars för en intervju.

- Here is something I found on the web about basic maths and literacy skills:

1 in 5 adults in the UK can't read well enough to find plumbers in the Yellow Pages index and far more people have difficulties with numbers. For example, 1 in 4 adults don't know what change they should get from £2 after buying a few things from the newsagents.

<http://www.lse.ac.uk/collections/LSEHousing/pdf/bbsnewsletter.pdf>

- How would you comment on this? Do you believe that there are indeed more people who have problems with numbers than there are people who struggle with reading?

I think there are probably as many, and according to a report by the UK Basic Skills Agency, the impact of maths problems on people's lives is even greater than is the impact of literacy problems. For example, having maths problems appear to be more disabling. People who have maths difficulties seem not to get promoted at work and so on to the extent as do their colleagues with normal maths skills.

- From what I understand, your definition of DD (Developmental Dyscalculia) is more "orthodox" than most others'. You reserve the term DD for biologically based problems with numerosity only – no other part of maths are included. Why is this? Why would you not include for example arithmetical skills in the definition?

Children can have problems with maths for many reasons. A problem with arithmetic may be caused by several different things, it does not have to be DD. To teachers, the consequences are completely different depending on the cause. If it is not DD, the consequences are usually quite straight forward: teaching can improve maths skills. But we don't know yet if there is any method that might "cure" DD. According to a follow-up study in Israel¹ of children with DD, 95% percent of the children diagnosed with DD in fifth grade were still performing within the lowest quartile for their age six years later.

- You have said that there might be a survival aspect to numerosity skills in that they help you determine how many enemies are attacking and whether you should fight or take flight. If that is so, how come there are

1 "Developmental dyscalculia: a prospective six-year follow-up" (2005). Shalev R, Manor O, Gross-Tsur V. http://journals.cambridge.org/download.php?file=%2FDMC%2FDMC47_02%2FS0012162205000216a.pdf&code=10be15f6ff468777f111c69b82140018

still people around with a deficit in *numerosity*? In other words, why have they not all been eaten by lions or killed by hooligans by now?

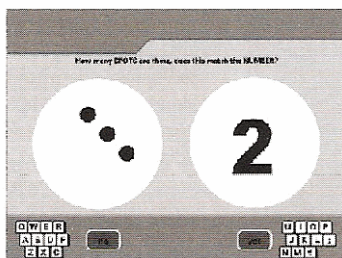
Well...this is the eternal question of all types of evolutionary research, isn't it? However, when it comes to DD, the "selective pressure" has not been very strong during, say, the last 10,000 years. We live in a less jungle-like environment today. That might explain some of what you are asking about.

- There are several definitions of dyslexia around, but in the last 5-10 years, consensus seems to have grown. Prevalence is usually estimated to be around 4-8%, depending on definitional criteria. With your definition of DD, how many would you say are affected by that?

I would say about 6,5%. This is what was found in a recent study both in Cuba, where a cohort of 11500 children were assessed. That is the largest studies of DD so far. Similar results have been found in a big Israeli study. But of course, prevalence figures depend on what level of difficulty you are looking at.

- Researchers like David Geary have tried to find subtypes of mathematical difficulties. Have you been able to see any subtypes of dyscalculia, or should we see it as one core skill?

No, we have not distinguished any subtypes so far. But it may be that some assessment tasks are more powerful than others. In "Dyscalculia screener", it may be that the dot enumeration task (see test sample below) is a more powerful assessment task than some of the others.



Picture from "Dyscalculia screener" by Brian Butterworth. Publishers: nferNelson, 2003. Instruction: "How many SPOTS are there, does this match the NUMBER?"

- Why do you think so many children with reading problems struggle with maths?

All types of classroom learning are going to be affected by reading difficulties. Dyslexics often have working memory problems that may affect calculation, but not necessarily the understanding of basic numerical concepts. But beyond that, I really don't know.

- Is there any aspect of maths, which is a wide subject, that children with dyscalculia might do better at? Why would this be?

If, as I have proposed, dyscalculia is problem with numbers and number concepts, then aspects of maths that do not depend so crucially on these things may not be so affected. I have met several severe dyscalculics who are good at geometry or good at logic, even mathematical logic - which doesn't involve numbers. Algebra, as far as I can tell from my research with adult dyscalculics seems to fall somewhere in between geometry and arithmetic. One problem is the structure of the curriculum. Most students need to get past basic arithmetic before they are even allowed to progress to algebra, geometry and other abstract branches of mathematics. It is often said by mathematicians that there are two types of mathematician: those that can count and those that can't.

- I understand you see numerosity as quite independent from language?

Yes, I do see numerosity and language as separate skills. Certainly if you look at the brain areas involved in reading and mathematical processing respectively, there really is no overlap.

- So, what is your comment on what some say, namely that "Maths too is a kind of language"?

I would say: It isn't! If people struggle to learn maths, it is because they can't understand the symbols and the logic of maths. The way I see it, maths is not language.

- But several studies, for example, the PISA study, imply that the comorbidity between literacy and maths problems is strong and many teachers would agree. What is your take on this?

Yes, it appears that there is a high correlation. But that does not mean there is a causal relationship. At this stage, I would say the reasons for the comorbidity seen between literacy and maths are unknown.

- From my own experience, many children with dyslexia struggle to learn their tables, to recite the alphabet and to memorise other "mechanical" facts by heart. How does that sound to you?

Well, it may be, that if you have poor language skills, verbal teaching of things like the tables could be bad. Perhaps they could find a different way of learning these things.

- Some researchers see parallels between phoneme awareness and number awareness. What is your view on this?

This is an interesting parallel. The question is why a child with good cognitive abilities and adequate educational opportunities is unable to do what most children find easy. It has to be something pretty basic. In most dyslexias, as you suggest, it is in phonological awareness; and in dyscalculia it seems to be an

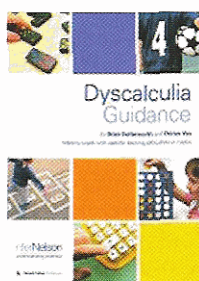
awareness of the meaning of numbers.

- *What is the relationship between dyscalculia and memory skills?*

We remember things we understand. If we don't understand them, they seem to slip our minds. In my view, then, the causal relationship is this: poor understanding of numerical concepts leads to poor memory for numerical concepts and arithmetical facts. People have argued for the causal relationship going the other way: poor memory leads to poor understanding. But that certainly isn't what we find in our research.

- *Most of our readers are teachers, so I wish to ask about teaching implications of DD. What can you say about intervention?*

I can say a lot about that! Firstly, children with DD should not be taught with the rest of the class. Kids who expose their incapacities suffer. Secondly, focus on understanding the concepts - "drill and practice" does not work in DD. We have tried to describe how concepts can be taught in a book called "Dyscalculia Guidance"². But really, what's in there should be familiar to most preschool teachers.



- *How should we assess maths, in order to detect DD?*

Watch out for all kids who are seriously behind on attainment tests, but it is important to look qualitatively at what they do and not just look for accuracy. We need to understand what strategies children are using. Some children might end up with a correct answer randomly but still be using very immature and time-consuming strategies.

- *If you compare dyslexia research and DD research, what would you say about the situation?*

We should remember that DD research is a very recent thing. It is only in the last, say, 10 years that we have seen substantial research in DD. We don't have 30 years of experience, as we have in dyslexia.

2 "Dyscalculia Guidance". Publisher: nferNelson. Author(s): Brian Butterworth and Dorian Yeo. First Published: June 2004.

3 www.standards.dfes.gov.uk/primary/faqs/inclusion/56233/

- *What is the general awareness of DD in the UK?*

Sadly, there is no universal understanding yet the way there is about dyslexia, although the DfES [Department for Education and Skills] now has some information about dyscalculia on their website³.

- *In your opinion, what is the most important area for DD research?*

Actually, I think the most important thing right now is to implement the knowledge we have. We know enough about DD now to make a change! It is urgent, because kids are suffering out there, and it could be done. The government must take action and there is a need for teacher training.

- *Finally, what projects are you involved in right now?*

We have known which areas are involved in numerosity skills for a while. Now we are trying to find out more about which brain circuits are involved. Also, we are investigating how brain areas may differ in people with dyscalculia. Genetics is another area of interest and there are twin studies being carried out. Also, we are trying to look into computerised intervention.

Butterworths hemsida, varifrån man både kan lyssna på intervjuer och ladda ner bra artiklar:
<http://www.mathematicalbrain.com/>

Rotfrukt

- *morfologisk arbetsbok för lärare på mellannivå*



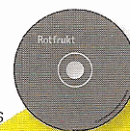
Ett rent arbetsmaterial med muntlig och skriftlig övning (inkl kopieringsunderlag) som ger rika tillfällen till aha-upplevelser. Övning som stimulerar den språkliga kompetensen, som ökar läsförmåga och stavningssäkerhet och som väcker lust till språket.

Författare: Merete Herrström, ISBN 91-973469-4-2

Rotfrukt

NYTT!

- *morfologisk övning på cd-rom*



Programmet kompletterar arbetsbokens övningar. Eleverna arbetar i egen takt och har tillgång till mer än 1600 uppgifter som befäster den morfologiska insikten. Programmet kan styras med tangentbord och har begränsat stöd för SAPI-kompatibel talsyntes.

ISBN 91-973469-5-0

Beställ hos:

Ordfabriken, Komstad 175, 272 96 Gärnsås
tel: 0414-510 35, fax: 0414-51015
e-post: info@ordfabriken.se, www.ordfabriken.se

