From experiment to application: semantics and pragmatics as a window to bilingual language competence

Napoleon Katsos

Theoretical and Applied Linguistics

University of Cambridge
• Characteristics of linguistic development in two common developmental disorders, *Autism Spectrum Disorder (ASD)* and *Developmental Language Disorder (DLD)*

• Key features of bilingual language development

• Guidelines about assessing and supporting language in children with developmental disorders

• Ways forward and challenges?
“… the most common developmental disorder you have never heard of…”

Norbury et al 2016, JCPP

https://www.youtube.com/user/RALLIcampaign
Developmental Language Disorder

• DLD (formerly known as SLI – Specific Language Impairment)

• affects approximately 2 children in every classroom (or 7.5% of the population in the UK)

• 2-3 year gap in language skills during the first three years of primary school, with little evidence of ‘catching up’ with peers

• difficulties in producing and understanding language, ranging from vocabulary to morphosyntax and pragmatics in the absence of other biological or environmental causes

• impacts negatively on literacy, academic achievement, peer relations, self-esteem…

Norbury et al 2016, JCPP

https://www.youtube.com/user/RALLIcampaign
Autism spectrum disorders

- Life-long neurodevelopmental disorder, 695,000 in the UK may be autistic (1.1% of the population)

- Defined by a set of behavioural criteria. E.g. in DSM-5:
  - Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays
  - Restricted, repetitive patterns of behavior, interests, or activities
  - Language skills range from highly-verbal to non-verbal
Bilingualism

- the norm in many places of the world

- 2 out of 3 of children in the world! (Crystal 1997)
Bilingualism in UK schools

‘English as an Additional Language’
20% in primary
15% in secondary

Strand, S., Malmberg, L., Hall, M., English as an Additional Language (EAL) and educational achievement in England: An analysis of the National Pupil Database
Key features of bilingual language development

• Diversity

• Difference
Key features of bilingual language development

• Diversity (language combination, age of onset, duration, amount and quality of input, use…)

• Generally speaking, whether simultaneous or sequential bilinguals, there will be differences with monolinguals, esp in early years

  • Code-mixing
  • Language transfer
  • Perhaps smaller vocabulary (especially in non-dominant language)
  • Slower development of morphosyntactic knowledge (especially in non-dominant language)
Bilingualism and developmental disorders?
Parental and professional attitudes
(Kremer Sedlik, 2005; Kay Raining, Bird, 2012; Hampton, et al. under review)

Interviewer When did you stop speaking Armenian to him?
Mother As soon as I um knew about- um almost four years we started. We turned the languages at home from Armenian to English.

Interviewer So -so what made you do that at four?
Mother Um because I did not want to confuse the kid.

Interviewer It was your idea?
Mother It was the doctor told me that that it might be better.

Mother He was like age four. In order to help him move forward a little faster to make her- to make him speech can catching up as same age kids I- she [the clinician] suggested we need to use English more often.
Practitioner Review: Multilingualism and neurodevelopmental disorders – an overview of recent research and discussion of clinical implications

1. Mirko Uljarević1,2,*,
2. Napoleon Katsos3,
3. Kristelle Hudry1 and
4. Jenny L. Gibson4

Version of Record online: 22 JUL 2016

1 – To synthesise the available evidence on multilingualism and developmental disabilities in order to inform clinical practice

2 – To inform research by appraising quality of studies in the field and identifying gaps in the literature
Results

- Communication Disorders (n=39; 30 in Specific Language Impairment, 7 in Stuttering, 2 in phonological disorder)
- Autism Spectrum Disorders (n=10)
- Intellectual Disability (Down Syndrome, n=2)
- No studies on multilingualism in Specific Learning Disorder, ADHD or Motor Disorders were included
- Findings in general across all conditions suggest that there is little support for the belief that bilingualism is detrimental to children with developmental difficulties
Practitioner Review: Multilingualism and neurodevelopmental disorders – an overview of recent research and discussion of clinical implications

Journal of Child Psychology and Psychiatry


Version of Record online: 22 JUL 2016

Ask the Experts

How does multilingualism affect the communication of children with neurodevelopmental disorders?

Dr Bogdan Czotar, Dr Jenny Gibson, Katja Howard, and Dr Napoleon Katsos

Department of Theoretical and Applied Linguistics and Faculty of Education, University of Cambridge

Speaking more than one language can pose both a challenge and an opportunity for multilingual families with children with neurodevelopmental disorders. In the case of loss, reported in Ismail and Newbick's study (2019), diagnosed with autism spectrum disorder (ASD) and delayed language development, Isma

But what is the scientific evidence to help families make the best decisions on language use? Despite the growing prevalence of bilingual children in UK primary schools (NfEBC, 2014) and elsewhere, there is little research into bilingualism in children with neurodevelopmental disorders, which affects an estimated 3–15% in the UK (Law, 2009).

Bilingualism and neurodevelopment

A prevailing belief among parents and some professionals is that if learning one language is hard for the child, then the two languages will be more difficult to master. The assumption is that if the family switches to the dominant language, the child's language may develop more quickly. This family is therefore advised.
Bilingualism and Language Difficulties

• RCSLT recommendations for bilingual clients (June 2018)

• Beware of ‘forced monolingualism’

• …of over-diagnosing and under-diagnosis of difficulties

• …of Assessment bias (linguistic and cultural)
The main aim of assessment is to differentiate diversity from disorder.

Assessment and intervention must always be carried out in both/all languages.

The World Health Organization International Classification of Functioning, Disability and Health (ICF, WHO, 2007) can be effectively used to aid the practitioner in factoring multilingualism into the clinical reasoning process.
Formal assessments and the use of normative data

Speech and language therapists must not use standardised assessments to assess bilingual children, or they should be considered supplemental as descriptive assessments (Hegde and Maul, 2006: 348). This is because standardised assessments have been proven to be inadequate for the diagnosis of language difficulties in bilingual children (Caesar and Kohler, 2007: 191).

In addition to the language input difference, there are also cultural reasons that bilingual children do not perform as well on standardised assessments. Children may fail to recognise objects, foods, activities and even people if they do not resemble these things from their everyday life experience. For example, even small differences such as US versions of popular assessments were changed for the British population. Children may also be unfamiliar with being tested in a formal setting and unfamiliar with the clinical environment.
Ways forward

• Use of interpreter and bilingual SLTs, case history, parental interview, and
  • dynamic assessment
  • (currently scarce) formal assessment tools standardised for bilingual populations
  • cross-linguistically applicable language assessment tools
## Challenges - 1

<table>
<thead>
<tr>
<th>Language</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polish</td>
<td>546,000</td>
<td>1.0%</td>
</tr>
<tr>
<td>Punjabi</td>
<td>273,000</td>
<td>0.5%</td>
</tr>
<tr>
<td>Urdu</td>
<td>269,000</td>
<td>0.5%</td>
</tr>
<tr>
<td>Bengali (incl Sylheti, Chatgaya)</td>
<td>221,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>Gujarati</td>
<td>213,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>Arabic</td>
<td>159,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>French</td>
<td>147,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>Chinese</td>
<td>141,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>Portuguese</td>
<td>133,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Spanish</td>
<td>120,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Tamil</td>
<td>101,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Turkish</td>
<td>99,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Italian</td>
<td>92,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Somali</td>
<td>86,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Lithuanian</td>
<td>85,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>German</td>
<td>77,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Persian</td>
<td>76,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Languages of the Philippines</td>
<td>70,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Romanian</td>
<td>68,000</td>
<td>0.1%</td>
</tr>
</tbody>
</table>
Clinical Evaluation of Language Fundamentals®-Preschool-2
(CELFR®-Preschool-2)

Eleanor Semel, EdD, Elisabeth H. Wiig, PhD, Wayne A. Secord, PhD

Description
Measure a broad range of expressive and receptive language skills in young children with CELF-Preschool 2 UK.

Author(s)
Elisabeth H Wiig
Wayne Secord
Eleanor Semel

Publication Year
2006

Age Range
3 years to 6 years

Administration
Individual - 30 to 45 minutes

Qualification Code
CL2

£429.00 (Complete kit price from)
Cross-linguistically applicable language assessment tools

COST Action A33: ‘Crosslinguistically Robust Stages of Children’s Linguistic Performance’
• Rich and varied semantics and pragmatics of quantifiers:

‘All’, ‘kol’, ‘todos’, ‘wszystkie’…As are Bs: $A \cap B = A$

Some As are Bs: $A \cap B \neq \emptyset$

Most As are Bs: $|A \cap B| > |A - B|$

No As are Bs: $A \cap B = \emptyset$

Some As are not Bs: $A \cap B \neq A$

Not all As are Bs: $A \cap B \neq A$

• Subtler similarities: ‘all’, ‘each’, ‘every’; ‘oli’, ‘kaθe’
Constraints on the acquisition of quantifiers?

• Crosslinguistic similarity in the meaning of quantifiers might lead to crosslinguistic similarities in the order of acquisition (Katsos, et al., 2016, PNAS)
All the Fs are in the boxes
None of the Fs…
Some of the Fs…
Most of the Fs…
Not all the Fs…
Some of the Fs are not…

If participant says ‘WRONG’
Experimenter asks ‘Why?’
All the Fs are in the boxes
None of the Fs…
Some of the Fs…
Most of the Fs…
Not all the Fs…
Some of the Fs are not…
All the Fs are in the boxes
None of the Fs…
Some of the Fs…
Most of the Fs…
Not all the Fs…
Some of the Fs are not…
- 31 languages, 15 genera, 11 types (families and isolates) classified according to WALS.
- Participants: 5- to 6-year-old children (n=768) and adults (n=536)
- Task took 25-30 minutes, 3 pseudorandomised orders of presentation.
- Rejections were justified on the grounds of the quantity of objects inside the boxes.
Percentage of rejections of false and under-informative conditions for the average of ‘some’, ‘some ... not’ and ‘most’ by 5-year-old children and adults.
Predictions and Results

1. Positive > negative, (‘all’, ‘some’) > (‘none’, ‘some…not’)
   Upward-monotone > downward monotone
2. Totality > Partiality
   (‘all’, ‘none’) > (‘some’, ‘some…not’, ‘not all’)
3. Complexity ‘some’ > ‘most’
4. Informativeness

- Multivariate analyses with each Constraint 1-4, Language/Genus/Type, Gender, Schooling, Age as well as relevant grammatical features

- Main effects of Language/Genus/Type but model comparison with AIC suggest models with Language/Genus/Type (including their interactions with the Constraints) are over-fitted compared to model without any language variable
Quantifiers as a language assessment benchmark?

- 81 Spanish-speaking children, 27 with DLD (mean age: 6;6, age range 4;0-6;9; 20 males; Katsos et al, 2011, *Cognition*)
- Two typically-developing (TD) control groups: Aged-matched (TD-AM) and Language-Matched (TD-LM)
Quantifiers: the optimally crosslinguistically translatable expressions?

- Having acquired the meaning of quantifiers in L1, child L2 learners should have *little* problem acquiring the meaning of quantifiers in L2.

- Morphosyntax, vocabulary depends on
  - length of exposure to L2
  - the specifics of the grammars learned
  - the status of the languages ((non)dominant)

  (Bittner et al., 2003; Genesee et al., 2004; among others)
Hypotheses

1. Children should perform better in the Polish version of TROG (a test of comprehension of morphosyntax) than the English one.
   Effect of language dominance / length of exposure

2. Children should perform less badly / at comparable levels in both versions of Quantifier Comprehension.
   Smaller [/no] effect of language dominance / length of exposure
Ways forward: bilingual language assessment

- Katsos, Haman & Miekisz *in prep*
  - Age: 6;10 (4;11 – 7;10)
  - Age of onset of English: 2;3 (birth – 4;1)
  - Length of exposure to English: 3;10 (1;8 – 6;2)
- Between-language correlations for Quantifiers are stronger than correlations for vocabulary and morphosyntax
Bilingualism: Polish-English children

<table>
<thead>
<tr>
<th>Method</th>
<th>measure</th>
<th>Polish</th>
<th></th>
<th>English</th>
<th></th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td>semantic</td>
<td>0,81</td>
<td>0,18</td>
<td>0,82</td>
<td>0,15</td>
<td>-0,20</td>
<td>10</td>
<td>0,846</td>
</tr>
<tr>
<td></td>
<td>pragmatic</td>
<td>0,45</td>
<td>0,35</td>
<td>0,43</td>
<td>0,33</td>
<td>0,40</td>
<td>10</td>
<td>0,695</td>
</tr>
<tr>
<td></td>
<td>overall</td>
<td>0,72</td>
<td>0,15</td>
<td>0,71</td>
<td>0,16</td>
<td>0,08</td>
<td>10</td>
<td>0,937</td>
</tr>
<tr>
<td>TROG</td>
<td>Number of errors in the</td>
<td>7,82</td>
<td>3,22</td>
<td>10,09</td>
<td>2,59</td>
<td>-2,11</td>
<td>10</td>
<td>0,062</td>
</tr>
<tr>
<td></td>
<td>last 5 blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of blocks passed</td>
<td>9,82</td>
<td>5,58</td>
<td>6,82</td>
<td>3,28</td>
<td>2,32</td>
<td>10</td>
<td>0,043</td>
</tr>
<tr>
<td></td>
<td>Total score</td>
<td>103,64</td>
<td>24,46</td>
<td>91,27</td>
<td>15,88</td>
<td>1,94</td>
<td>10</td>
<td>0,081</td>
</tr>
</tbody>
</table>

M – mean; SD standard deviation; df – degrees of freedom; p – two-tailed significance level
QC correlates better between languages

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Method</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>QC Polish/English</td>
<td>0.86</td>
<td>0.001</td>
</tr>
<tr>
<td>TROG Polish/English</td>
<td>0.38</td>
<td>0.001</td>
</tr>
<tr>
<td>TROG Polish/QC Polish</td>
<td>0.56</td>
<td>0.001</td>
</tr>
<tr>
<td>TROG English/QC English</td>
<td>0.60</td>
<td>0.001</td>
</tr>
</tbody>
</table>

r - Pearson's correlation coefficient; F - Fisher's transformation test of significance; p - significance level
Challenges facing bilingual language test development

### Challenges - 1

<table>
<thead>
<tr>
<th>Language</th>
<th>Speakers (2011)</th>
<th>Percent of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polish</td>
<td>546,000</td>
<td>1.0%</td>
</tr>
<tr>
<td>Punjabi</td>
<td>273,000</td>
<td>0.5%</td>
</tr>
<tr>
<td>Urdu</td>
<td>249,000</td>
<td>0.5%</td>
</tr>
<tr>
<td>Bengali (incl Sylhet, Chattag)</td>
<td>221,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>Gujarati</td>
<td>213,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>Arabic</td>
<td>199,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>French</td>
<td>147,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>Chinese</td>
<td>141,000</td>
<td>0.3%</td>
</tr>
<tr>
<td>Portuguese</td>
<td>133,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Spanish</td>
<td>120,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Tamil</td>
<td>191,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Turkish</td>
<td>99,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Italian</td>
<td>63,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Somali</td>
<td>63,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>Lithuanian</td>
<td>65,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>German</td>
<td>77,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Persian</td>
<td>76,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Languages of the Philippines</td>
<td>70,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Romanian</td>
<td>65,000</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

### Challenges - 2

**Clinical Evaluation of Language Fundamentals® - Preschool-2**  
(CELF®-Preschool-2)

*Eleanor Semel, EdD, Elizabeth H. Wijg, PhD, Wayne A. Secord, PhD*

**Key Information**

- **Description**: Measure a broad range of expressive and receptive language skills in young children with CELF-Preschool2 UK.
- **Author(s)**: Elizabeth H. Wijg, Wayne A. Secord, Eleanor Semel
- **Publication Year**: 2006
- **Age Range**: 3 years to 6 years
- **Administration**: Individual - 30 to 45 minutes
- **Qualification Code**: CL2

£429.00 (Complete kit price from)
Technology in language assessment

Meet AppLapp

Based on research at the University of Cambridge, appLapp is an online game for children, assessing their speech and language skills while they’re having fun! It can also boost their learning, and put you in touch with a specialist to talk to, if you’d like.

Learn more
What are the implications for ....?

• Children & Families
• Educators
• Service providers
  • Ethics
  • Risk communication
  • Solution-oriented
Beyond numbers...
Key points

• Assessment of bilingual language development in childhood is a challenge
  • Culturally and linguistically
  • Researchers, clinicians, teachers are increasingly becoming aware
  • Linguistics research & technology offers several ways forward
‘Applied’ experimental semantics and pragmatics
‘Applied’ experimental semantics and pragmatics
Thank you!

nk248@cam.ac.uk