Dataset deposit for the ESRC Data Archive, Essex

ESRC-funded project #R000236696: The prosodic abilities of school-age children: a developmental study.

Dataset title: Profiling Elements of Prosodic Systems in Children (PEPS-C)

Authors: Bill Wells and Sue Peppé email: bill.wells@ucl.ac.uk; s.peppe@ucl.ac.uk

1. Description of the originating project
Aims of project:
- to build up a comprehensive picture of the development of various facets of prosodic ability in the school years, by administering a range of tests of prosodic output and comprehension, and to relate prosodic development to other aspects of linguistic development;
- to provide a data base against which to evaluate theories of prosodic development in the school years;
- to develop a prosodic assessment procedure for school-age children that can be used by speech and language therapists and other professionals;
- to investigate whether the relationship between prosodic output and comprehension changes with age, and if so, in what ways;
- to study qualitative changes in the prosodic realisation of linguistic / communicative functions, between 5 and 14 years.

Entities studied and recorded: For this study of normally-developing children, 120 children were recruited from state schools in North London in the school year 1997/8 according to the following criteria:
- first language English;
- no speech and language problems;
- no marked educational/behavioural problems;
- resident in the south east of England 3 years.
- Equal numbers (15) of boys and girls were recruited in each of 4 age-bands, of which the average ages were 5;6, 8;7, 10;10, 13;10.
A further 73 children (18 aged 5;6, 17 aged 8;6, 18 aged 10;8, 20 aged 13;7) otherwise meeting the same criteria were recruited for a supplementary set of tasks.

2) Application of methodology
Data collection: children were interviewed in their schools and were recorded on digital audiotape, using a HHB Portadat PDR 1000 recorder. In addition, recordings of much of the data were made using a laryngograph with oscilloscope (Thandar SC110A).
The interviews consisted of an intonation assessment and two other tests as measures of receptive and expressive language respectively:
- PEPS-C assessment battery: see Appendix A for a testscript which includes instructions, demonstration examples, practice items and test-items;
- TROG (Test for the Reception of Grammar, Bishop 1983);
- CELF-R (Clinical Evaluation of Language Fundamentals - Revised) sentence formulation task (Semel, Wiig and Secord, 1987).
The PEPS-C test was derived from an earlier test devised for use with adults (Profiling Elements of Prosodic Systems (PEPS): Peppe 1998, unpublished thesis, University College London). Measurements and collection instructions were adapted for children in consultation with the Development Research Group, Department of Human Communication Science, UCL.
Data was recorded on scoresheets during and after the interviews, and then transferred onto an Excel spreadsheet. The first 18 interviews were rescored by the main administrator after half the interviews
had been conducted, and 10% of all the scores were checked by at least two independent raters. When all the material had been collected the scores on the spreadsheets were checked against those on the scoresheets and amendments made accordingly. Missing items were treated as follows: where a task was not performed, the score is recorded as a blank, as distinct from a task where a zero score was obtained, which is recorded as 0. Where some items of a task were not performed or not scorable, a pro rata score was awarded.

**Statistical data:** calculations of frequencies of scores on each task were carried out, using the Kolmogorov-Smirnov 1-sample test in SPSS. Histograms of the scores were compiled, with the normal curve superimposed to show how much the scores deviated from it. Ceiling effects could be seen in many of them. Non-parametric tests were carried out on all the tasks to look for the effect of certain variables: gender, task presentation order and age. The results are reported below, and the significance of score-differences between age-groups can be found in a table in Appendix B (Microsoft Word 7.0).

**Gender.** Mann-Whitney tests suggest no effect for sex in most of the tasks at most ages. Exceptions to this were:

i) the Affect output function task (expressing like/dislike), where boys scored better than girls: the effect being significant at .007 for 5 year-olds (n = 30) and at .006 for 8 year-olds (n = 30) but not apparent for 10- and 13-year-olds.

ii) 3 out of the 4 form input tasks in 13 year-olds, where, however, the effects were not consistent. Boys scored better than girls in the Affect form input task (sig. = .015, n = 30) and in the Interaction input form task (sig. = .045, n = 30), but girls scored better than boys on the Focus input form task (sig. = .009, n = 30).

**Order of presentation.** The task-order was varied in that for half the participants input tasks preceded output tasks and vice versa for the other half. Again using Mann-Whitney tests, there appears to be no effect for task presentation order either overall or in the two lowest age-groups, and in only one task for 10 year-olds (the Interaction output function task was performed better by those who did the input function task beforehand; sig. = .037, n = 30). Among 13-year-olds, however, particularly in the form tasks, participants who did the output (imitation) task first scored more highly in both input and output tasks than those who did input (same-different) tasks first in Chunking and Affect. The effect was significant at the .05 level in all these tasks (Chunking input form .018, Chunking output form .021, Affect input form .038, Affect output form .025, n = 30 in all). In function tasks there was significance for 13 year-olds at the .01 level (sig. = .006, n = 30) in the Chunking input task: again, those who did the output task beforehand scored better than those who did not.

**Age.** On all tasks where there was no effect for either sex or order in any age-group, Mann-Whitney tests for the effect of age were carried out. Results are presented in the table in Appendix B.

**Data:** the data materials are contained in a spreadsheet (Microsoft Excel 97, readable by both Windows 95 and Windows 98). The first worksheet contains the data, with scores first as percentages and then in their raw form. It will be noted that scores for one communication area (Focus) are from 73 children who are different from the 120 who provided the scores for the other three areas (Chunking, Affect and Interaction). This is because the original tasks devised to test Focus skills had to be revised. The task-legend, i.e. explanations of the abbreviation labels for tasks, can be found preceding the data on the worksheet. There is no confidential data, since each participant is identified only by number.

The subsequent worksheets (2 - 5) show the ranges of normal prosodic ability for each communication area in each age-group, measured as 1.5 standard deviations above and below the mean in accordance with normal clinical practice. These are not included in the ASCII file, but are available for users of Microsoft Excel. Data are not standardised.
Access conditions: an abbreviated form of the test may be published soon; if not, it is intended that the test materials (flashcards and stimulus-tape) will be made available according to demand. For further information please apply to one of the authors.

Training: the test has been designed so that it can be administered by speech and language therapists with a minimum of training. This training will be provided in one-day workshops organised by the Department of Human Communication Science, University College London. The first of these will take place on 29 June 1999. Topics will include:

- Prosodic development, normal and atypical;
- PEPS-C: rationale, structure, normative data;
- Practical administration of the battery;
- Scoring;
- Interpretation of results.
Appendix A: PEPS-C: PROFILING ELEMENTS OF PROSODIC SYSTEMS IN CHILDREN

Testing input and output of four communicative functions effected by prosody, splitting semantic (function) and phonetic (form) aspects.

Transcription symbols:
↑ : pitch step up; ↓ : pitch step down; ↘ rise; ↗ fall; ^ : rise-fall; ~ : fall-rise; L : low; H : high;
underline : accented

Chunking
Traditional description (Halliday, Crystal, O’Connor Arnold): use of tone-groups/information-units;
phonic means: variation in pitch-movement, lengthening and silence (pause/ phonation-break)

<table>
<thead>
<tr>
<th>Task:</th>
<th>Boundary-marking</th>
<th>Examples of stimuli</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>1</td>
<td>input: 2 or 3 items</td>
<td>cream-buns/cream, buns and jam</td>
</tr>
<tr>
<td>2</td>
<td>output: 2 or 3 items</td>
<td>cream-buns/cream, buns and jam</td>
<td>picture-strips</td>
</tr>
<tr>
<td>Form</td>
<td>3</td>
<td>input: same-different</td>
<td>cream-buns/cream, buns and jam</td>
</tr>
<tr>
<td>4</td>
<td>output: copy</td>
<td>90, 1, 2; 91, 2</td>
<td>tape</td>
</tr>
</tbody>
</table>

Affect
Traditional description: attitudinal use of contours; phonetic means: variation in pitch-direction (rise-fall, fall-rise)

<table>
<thead>
<tr>
<th>Task:</th>
<th>opinions: like/not like</th>
<th>Examples of stimuli</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>5</td>
<td>input: ‘^m’, ‘~m’</td>
<td>bananas</td>
</tr>
<tr>
<td>6</td>
<td>output: ‘m’ meaning like/not like</td>
<td>bananas</td>
<td>named items</td>
</tr>
<tr>
<td>Form</td>
<td>7</td>
<td>input: same-different</td>
<td>1-syllable words, ^ and ~</td>
</tr>
<tr>
<td>8</td>
<td>output: copy</td>
<td>1-syllable words, ^ and ~</td>
<td>tape</td>
</tr>
</tbody>
</table>

Interaction
Traditional description: propositional use of contours to distinguish sentence-type ;
phonic means: pitch-height (low, high), pitch-direction (rise, fall)

<table>
<thead>
<tr>
<th>Task: understanding check: query/affirm</th>
<th>Examples of stimuli</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>9</td>
<td>input: H↗ vs L↘</td>
</tr>
<tr>
<td>10</td>
<td>output: repeat word, ? or affirm</td>
<td>biscuit, lunny</td>
</tr>
<tr>
<td>Form</td>
<td>11</td>
<td>input: same-different</td>
</tr>
<tr>
<td>12</td>
<td>output: copy</td>
<td>1-syllable words, H↗ and L↘</td>
</tr>
</tbody>
</table>

Focus
Traditional description: use of nucleus placement to indicate focus of an utterance; phonetic means:
accent, i.e. pitch-change before focal item; pitch-movement, lengthening and loudness on it

<table>
<thead>
<tr>
<th>Task:</th>
<th>prefinal/final focus</th>
<th>Examples of stimuli</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>13</td>
<td>input: forgetful father</td>
<td>strawberries and cream.</td>
</tr>
<tr>
<td>14</td>
<td>output: Bingo</td>
<td>blue car? black car/blue bike</td>
<td>pictures</td>
</tr>
<tr>
<td>Form</td>
<td>15</td>
<td>input: same-different</td>
<td>strawberries and cream</td>
</tr>
<tr>
<td>16</td>
<td>output: copy</td>
<td>123; 123; 123</td>
<td>tape</td>
</tr>
</tbody>
</table>
**Preliminaries**

Start by showing children the 2 sheets of ‘vocabulary check’ pictures, and ask them to say what they see in each picture. Explain items that may be unfamiliar, e.g. coffee-cake, coffee icecream, chocolate fingers. Point out that the hand is a picture of fingers. Show them that there can be bottles and milk-bottles, cake and chocolate cake. You can do this while setting up tape recorder, labelling new tape, adjusting recording levels etc.

**1. Chunking: input function. 2 or 3?**

*Examples:*

Listen to this. This sounds like 2 pictures: [Tape: fruit-salad and milk.] Here’s a picture of fruit-salad and milk.

This sounds like 3 pictures: fruit, salad and milk. [Tape: fruit, salad and milk.] Here’s a picture of fruit, salad and milk.

You’ll hear some more lists like that.

If you think it sounds like 3 pictures, say 3. If you think it sounds like 2 pictures, say 2.

*Practice items:*

Try this [Tape: ‘jam, sandwiches, and milk chocolate-biscuits and jam.

*Items:*

1. chocolate, icecream and cake 3
2. milk-bottles and fingers 2
3. coffee-cake and cream 2
4. chocolate-fingers and buns 2
5. cream, buns and chocolate 3
6. chocolate-icecream and cake 2
7. coffee, cake and milk 3
8. chocolate, fingers and jam 3
9. milk, bottles and chocolate 3
10. coffee-icecream and cake 2
11. cheese, sandwiches and buns 3
12. fish-fingers and icecream 2
13. cream-buns and coffee 2
14. coffee, icecream and fish 3
15. cheese-sandwiches and milk 2
16. fish, fingers and bottles 3
2. **Chunking: output function. 2 or 3 items**

*No cuetape*

Now it’s your turn to do that.

**Examples:**
Here’s a card with 2 pictures on it. Tell me what you see. Make them sound like two things*
[Fruit-salad and milk]
Here’s a card with 3 pictures on it. Tell me what you see. Make them sound like 3 things.*
[Fruit, salad and milk.]
Here are some more cards: some have 2 pictures on, some have 3.
Look at the cards one at a time and tell me what’s on each card.
I’m not going to look at them; I’m going to put up this screen and try to guess whether you’ve seen 2 pictures or 3 pictures by the way you say it.
As you finish each card, put it in this box.

**Practice items:**
[2 of the picture-cards]
Give child 12 shuffled picture-strips; child turns them over one by one and says what’s on each. Tester notes down 2 or 3 on scoresheet. At the end, check cards for whether subject was saying 2s or 3s.

**Items:**
The picture-cards to be shuffled include such items as:
1. cream-buns and jam
2. cream, buns and jam
3. chocolate-ice-cream and honey
4. chocolate, ice-cream and honey
5. coffee-cake and tea
6. coffee, cake and tea
7. milk-bottles and bread
8. milk, bottles and bread
9. fish-fingers and buns
10. fish, fingers and buns
11. fruit-salad and milk
12. fruit, salad and milk
13. cheese-sandwiches and cake
14. cheese, sandwiches and cake
15. chocolate-cake and cream
16. chocolate, cake and cream

etc. Only 12 responses are needed. Spare items are included in case a child forgets what a picture designates, or produces some items in the form: ‘cake and tea’, or ‘coffee and cake and tea’.

*It is usually unnecessary to add this sentence, but occasionally a child will start saying them in an unnatural way for some reason, and this sentence makes the task clear.*
3. Chunking: Input form. Same or different

Cuetape. Laryngograph only
Now you’re going to hear some noises on the tape. The noises sound as if the person making them had her head under a pillow at the time.

Examples
She’s going to make two noises. These 2 are the same. [ham, burgers and coke, twice]
Now another 2 noises. These 2 are different. [ham, burgers and coke, hamburgers and coke]

Practice items:
Listen to these pairs and after each one say whether you think they’re the same or different:
[laryngograph stimuli]:
  coffee-ice-cream and fruit  coffee, ice-cream and fruit
  cheesecake and cream  cheesecake and cream
[If subject gets these wrong, repeat them, saying ‘listen again’]
Here are some more:

Items:
1. cream-buns and jam  d 2-3  cream, buns and jam
2. jelly, beans and cake  s 3-3  [jelly, beans and cake]
3. chocolate, cake and honey  d 3-2  chocolate-cake and honey
4. coffee-cake and tea  d 2-3  coffee, cake and tea
5. cheeseburgers and pears  s 2-2  [cheeseburgers and pears]
6. fish, fingers and eggs  s 3-3  [fish, fingers and eggs]
7. chocolate-cake and honey  d 2-3  chocolate, cake and honey
8. milk, bottles and bread  d 3-2  milk-bottles and bread
9. coffee-cake and tea  s 2-2  [coffee-cake and tea]
10. cheese-sandwiches and pears  d 2-3  cheese, sandwiches and pears
11. cheese, cake and pears  d 3-2  cheesecake and pears
12. cream, buns and jam  d 3-2  cream-buns and jam
13. fish, fingers and eggs  s 3-3  [fish, fingers and eggs]
14. jelly-beans and jam  d 2-3  jelly, beans and jam
15. cheese, buns and pears  d 3-2  cheese-buns and pears
16. milk-bottles and bread  s 2-2  [milk-bottles and bread]

*Instructions:*
You’ll hear some numbers on the tape. I want you to repeat them, not just saying the numbers but also copying the way they’re said.

*Examples:*
52,9. 60, 3, 9.

*Practice items:*
34, 5. 20, 1, 8
1. 30, 2, 1
2. 45, 6
3. 80, 9, 10
4. 42, 1
5. 90, 9, 8
6. 29, 2
7. 80, 1, 4
8. 20, 8, 5
9. 94, 3
10. 50, 6, 10
11. 35, 1
12. 93, 10
5 Affect: input function

Pictures: each item on separate cards, each laminated, all spiral-bound. 20 cards.

Here’s a smiley face and a doubtful face: somebody really enjoying himself and somebody who’s not too sure if he’s enjoying himself.

We want to find out what Seal likes. She’s quite unusual for a seal, because she eats lots of the same kind of food that we eat.

Examples:

Look at these pictures and tell me what you see on the first one. [Cake]
Seal really likes cake, so she makes a noise like this [Tape: ^ m]
She never goes “L ɖ m (ugh)” as if she hates it, but sometimes she sounds as though she doesn’t really like it. Say the next picture [Tea]
She doesn’t really like tea so she goes like this [Tape: ~ m]
You go through the pictures, one by one, saying what there is, and as you say each one, Seal will make a noise to show whether she likes it or not really. If you think she likes it, give me a smiley face here. If you think she doesn’t really like it, give me a doubtful face. Then turn to the next picture. [You may need to clarify what words the child will use; e.g. ‘Likes it’ and ‘Not keen’]

Practice:

Try this:
Strawberries  ^
Milk  ~

<table>
<thead>
<tr>
<th>Items</th>
<th>Recorded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cake.  ~m</td>
<td></td>
</tr>
<tr>
<td>Tea  ^m</td>
<td></td>
</tr>
<tr>
<td>Strawberries.  ^m</td>
<td></td>
</tr>
<tr>
<td>Milk  ~m</td>
<td></td>
</tr>
<tr>
<td>1. bananas  ~m</td>
<td></td>
</tr>
<tr>
<td>2. cheese  ^m</td>
<td></td>
</tr>
<tr>
<td>3. apples  ^m</td>
<td></td>
</tr>
<tr>
<td>4. jam  ~m</td>
<td></td>
</tr>
<tr>
<td>5. cream  ~m</td>
<td></td>
</tr>
<tr>
<td>6. chocolate  ^m</td>
<td></td>
</tr>
<tr>
<td>7. salad  ~m</td>
<td></td>
</tr>
<tr>
<td>8. chips  ~m</td>
<td></td>
</tr>
<tr>
<td>9. pears  ^m</td>
<td></td>
</tr>
<tr>
<td>10. bread  ~m</td>
<td></td>
</tr>
<tr>
<td>11. fish  ^m</td>
<td></td>
</tr>
<tr>
<td>12. pizza  ^m</td>
<td></td>
</tr>
<tr>
<td>13. ice cream  ~m</td>
<td></td>
</tr>
<tr>
<td>14. coffee  ^m</td>
<td></td>
</tr>
<tr>
<td>15. fruit  ~m</td>
<td></td>
</tr>
<tr>
<td>16 honey  ^m</td>
<td></td>
</tr>
</tbody>
</table>
6. Affect: output function.
No cue tape for first part, no pictures; 2 choice-cards (smiley face and doubtful face)

i) Now I want to know what food you like and what you’re not too keen on.
I’m going to read out things one by one like you did, and if you really like it, go “^m” like Seal did and
give me a smiley face. If you’re not too keen, go “~m” and give me a doubtful face. Keep your mouth
shut as you make your noise. [Children often have to be discouraged from making an open-mouthed
‘ugh’ or ‘yuk’ response to things they don’t like.]
Examples
Cake.
Coffee
Practice:
Strawberries.
Cabbage

1. bananas
2. cheese
3. apples
4. mushrooms
5. cream
6. tea
7. orange juice
8. cauliflower
9. pears
10. pineapple
11. fish
12. tomatoes
Extras: yogurt
leeks
broccoli
celery
7. **Affect: input form.**

*Cuetape:* 1-syllable words with all glides at different pitches: in pairs.

**Task:** same or different.

**Examples:**

Listen: these two sound the same:  
[laryngograph stimuli] H ~no ~no

These two sound different:  
[laryngograph stimuli] L ^yes ~yes

**Practice:**

What do you think about these two: are they the same or different?  
L ~what ~what

And these two?  
H ~fine ^fine

**Items:**

1. d H ^quite ~quite
2. s L ^oh ^oh
3. s H ~who ~who
4. s H ^where ^where
5. d L ~why ^why
6. d L ^when ~when
7. s H ~how ~how
8. d H ~one ^one
9. d L ^two ~two
10. d H ^three ~three
11. s H ^four ^four
12. d L ~five ^five
13. d H ^six ~six
14. d H ~eight ^eight
15. s L ~nine ~nine
16. d L ~ten ^ten
8. **Affect: output form.**

And this time I want you to say these words after you hear them said on the tape. Say them in exactly the same way that they sound on the tape:

*Example:* L^ yes

*Practice:*

H~ no
H^ ten

*Items:*

1. L ~ nine
2. H ^ quite
3. H ~ good
4. H ^ sure
5. L ^ yes
6. L ~ oh
7. H ~ one
8. L ^ two
9. H ^ four
10. L ~ five
11. H ~ see
12. L ~ twelve
9. Interaction: input function: L ‡ H ǂ (cup, key):

Pictures: 13 separate items, each laminated and all spiral bound together.
Stimuli: Words said either with L ‡ or H ǂ, meaning: “Yes I understood, please go on to the next” or “No I didn’t understand; please repeat.”

Instructions
Now you’re going to tell me what you see in these pictures and this time you have to listen to what I say. If I sound as though I heard what you said, you go on to the next picture. If I sound as though I didn’t hear you, or as though I want you to say it again, you say it again. You don’t go on to the next picture until you hear me sound quite certain. You may have to say some pictures quite a few times before I sound as though I want you to go on to the next.
I’m going to put this screen up so you can’t see from my face if I look as though I heard what you said.

Practice
Let’s start with the book with the cup on it. You say what you see.
child: Cup. Tester: L ǂ Cup. [child goes to next picture] Key. Tester: H ǂ Key? Child: Key. [many children go on to the next item at this point and have to be told “Listen again, Can you hear that I sound as though I didn’t hear what you said? That means you have to say Key again.”]


Items
Child: Tester:
1. Sun L ǂ Sun.
2. Star H ǂ Star?
5. Tree H ǂ Tree?
6. Tree L ǂ Tree.
7. Cloud H ǂ Cloud?
8. Cloud L ǂ Cloud
9. Car H ǂ Car?
10. Car H ǂ Car?
11. Car L ǂ Car.
12. Cap H ǂ Cap?
13. Cap H ǂ Cap?

Tester needs to take care with responding to the child. There are various ways of “sounding questioning” and “sounding affirming” but if stimuli are mixed it may be hard to know how to account for errors.

Cues for this task are not recorded, because if child goes on to next item when a repeat is wanted, the cuetape will be out of step. 16 items are required: there are 21 in the ‘book’ of test items.
10. Interaction: output function : (Echo)

No pictures

Choice cards: tick and question-mark

Seal is going to read you out some words. Sometimes it’ll be a word you know and you’ll be quite sure of it, so then you say the word again sounding quite certain. Sometimes it’ll be a word you don’t know, or you won’t be quite sure whether you heard it properly, and then I want you to say what you heard but making it sound as though you’re questioning, or puzzled.

If it’s a word you know, give me a tick. If it’s one you’re not sure of, give me a question-mark.

Demo:
biscuit
chisket

Practice items:
lemon
shapple
lunny

Items:
1. carrot
2. soffee
3. pargle
4. mushroom
5. creetsa
6. lettuce
7. wabbage
8. loppet
9. orange
10. jepper
11. pommon
12. fishcake
11. Interaction: input form

Stimuli: Laryngograph cue only. 1-syllable words with all glides at different pitches: in pairs.
Task: same or different.

Examples:
Listen: these two sound the same: [laryngograph stimuli] H əno əno
These two sound different: [laryngograph stimuli] L əyes əyes

Practice:
Try this pair. Are they the same or different? L əwhat əwhat
And what about this pair: H əfine əfine

Items
1. d L əgood əgood
2. s L əoh əoh
3. d H əwho əwho
4. s H əwhere əwhere
5. d L əwhy əwhy
6. d L əwhen əwhen
7. d H əhow əhow
8. s H əone əone
9. d L ətwo ətwo
10. s L əthree əthree
11. d H əfour əfour
12. s L əfive əfive
13. s H əsix əsix
14. d H əeight əeight
15. d L ənine ənine
16. d L əten əten
12. Interaction: output form

Say these words and copy the way they are said on the tape:

Examples:  
H ↘ yes  
L ↘ no

Practice:  
H ↘ what  
L ↘ fine

Items:  
1. L ↘ good  
2. H ↘ oh  
3. H ↘ who  
4. H ↘ where  
5. L ↘ why  
6. L ↘ when  
7. H ↘ how  
8. H ↘ one  
9. L ↘ two  
10. L ↘ three  
11. H ↘ four  
12. L ↘ five
13. Focus input function

Instructions and examples
Seal wants the two things you can see on that card. Her father brought her one thing and forgot the other, so she says this [Play: ‘I wanted STRAWBERRIES and cream’]. This means he forgot the strawberries. But if she says this [Play: ‘I wanted strawberries and CREAM’] it sounds as though he forgot the cream.

Look at the next card. Again, he brought one thing and forgot the other. If she says this: [Play: ‘I wanted CHOCOLATE and cake’] it’s the chocolate he forgot. But if she says this [Play: ‘I wanted chocolate and CAKE’] it’s the cake he forgot. I want you to turn over the cards and tell me which one he forgot each time. You can say which, or you can point to the picture.

Practice
Try this one:
I wanted bread and milk
And this one:
I wanted cheese and eggs

Items
I wanted ice-cream and cake
I wanted milk and buns
I wanted tea and coffee
I wanted jam and honey
I wanted cream and eggs
I wanted milk and cheese
I wanted cake and buns
I wanted eggs and fish
I wanted jam and tea
I wanted chocolate and ice-cream
I wanted bread and eggs
I wanted salad and fruit
I wanted bread and cheese
I wanted coffee and cream
I wanted cheese and honey
I wanted pizza and chips
14. Focus output function

Examples and practice

Here is a card with 4 pictures on it. I can’t see which pictures they are, but I’m going to offer you ones that might match them. First of all, how about a green car?  
Now you’ve got a green car so you say Oh I want a green car [Subject repeats]
Now you take it and put it face down on your green car, so it’s covered up.

How about a green bike?
You haven’t got a green bike but you’ve got a bike in another colour, so you say:
Oh, I want a white bike
[they might say yellow bike: explain that you go by the colour of the bike frame]
And I give you a white bike and you put it on your picture.

Then I might say How about a black boat? (showing them one)
Now you haven’t got a black boat but you’ve got something else black, a bus, so you say:
Oh I want a black bus, and I’ll give you a black bus.
Now you try it. How about a white car?
Response (hopefully): Oh I want a blue car (give blue car.)
[If this doesn’t work, repeat instructions]
If you offer e.g. a black boat and the response is just No, say “Have you got another colour boat, or something else (black)?”

Marking sheet:
As you give the stimuli, write letters (C, O, G, N, see below) in the Expected(Pattern) column to indicate the focal item that you expect in the response. This letter is determined by the content of stimulus and response:
Colour different, object same: focal item = Colour
Object different, colour same: focal item = Object
Both colour and object same as stimulus: focal item = Given
Both colour and object different from stimulus, i.e. focal item = New. This occurs when a child asks for a different picture, where neither colour nor object is the same as in the stimulus/offered picture. This is a valid response, but not one you were expecting, so change ExP letter to N.

Listen to responses and as you hear them write letters in Actual(Pattern). If you’re not sure that the response sounded appropriate, write ?

Card 2: on sheet: green bus, green car, black boat, blue bike. Stimuli:
How about a white car? Expect C: ‘green car’, so write C in ExP
How about a white bike? Expect C: ‘blue bike’, so write C in ExP
How about a green bike? Expect O: ‘green bus’, so write O in ExP
How about a black car? Expect O: ‘black boat’, so write O in ExP

Card 3: on sheet: green bike, white boat, blue bus, white car. Stimuli:
How about a white car? Expect G: ‘want a white car’: so write G in ExP
How about a green car? Expect O: ‘green bike’, so write O in ExP
How about a white bike? Expect O: ‘white boat’, so write O in ExP
How about a blue boat? Expect O: ‘blue bus’, so write O in ExP

Card 4: on sheet: black car, white bus, black bike, green boat Stimuli:
How about a blue bike? Expect C: ‘black bike’, so write C in ExP
How about a blue bus? Expect C: ‘white bus’, so write C in ExP
How about a green bike? Expect O: ‘green boat’, so write O in ExP
How about a white car? Expect C: ‘black car’, so write C in ExP

You may have to vary the stimuli if children ask for unexpected items; if so, try to a) get the focal pattern you want, b) keep the numbers of O-patterns and C-patterns roughly equal, and c) make sense of the game.
15. Focus input form

Cuetape (laryngograph)

Instructions
Listen: these 2 are the same: [laryngograph stimuli] bread and milk [bread and milk]
these 2 are different: [laryngograph stimuli] bread and milk bread and milk
these are the same: [laryngograph stimuli] cake and milk cake and milk
different: [laryngograph stimuli] cake and milk cake and milk

Listen to these pairs and after each one say whether you think they’re the same or different:

Practice
buns and cheese d buns and cheese
jam and bottles s jam and bottles

Items
1. jam and eggs d jam and eggs
2. bread and jam d bread and jam
3. cake and cream s cake and cream
4. cheese and fish d cheese and fish
5. buns and cake d buns and cake
6. coffee and honey d coffee and honey
7. honey and eggs s honey and eggs
8. cheese and cake s cheese and cake
9. bottles and honey d bottles and honey
10. cream and eggs s cream and eggs
11. cake and milk d cake and milk
12. chocolate and jam d chocolate and jam
13. cream and coffee d cream and coffee
14. jam and fish s jam and fish
15. ice-cream and honey d ice-cream and honey
16. buns and cheese d buns and cheese
## 16. Focus output form

Say these numbers in just the same way as you hear them said on the tape:

**Demo and practice items:**

1. 2 3.
2. 1 2 3.
3. 2 3 4.

**Test items:**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

- 3rd item: neutral stress
- 2nd item
- 1st item
Appendix B: Statistically significant age-related improvements on PEPS-C tasks

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Ch IFu</th>
<th>Ch OFu</th>
<th>Ch IFo</th>
<th>Ch OFo</th>
<th>Aff IFu</th>
<th>Aff OFu</th>
<th>Aff IFo</th>
<th>Aff OFo</th>
<th>Int IFu</th>
<th>Int OFu</th>
<th>Int IFo</th>
<th>Int OFo</th>
<th>Foc IFu</th>
<th>Foc OFu</th>
<th>Foc IFo</th>
<th>Foc OFo</th>
<th>FocOF</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-8</td>
<td>.001</td>
<td>.000</td>
<td>n/a</td>
<td>.010</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
<td>.012</td>
<td>.006</td>
<td>.004</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.001</td>
<td>.020</td>
<td>.012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
<td>.007</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-13</td>
<td>.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.044</td>
<td>.000</td>
<td>.048</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-13</td>
<td>.035</td>
<td>.010</td>
<td></td>
<td>.000</td>
<td>.005</td>
<td>.000</td>
<td>.000</td>
<td>.009</td>
<td>.000</td>
<td>.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: Ch = Chunking; Aff = Affect; Int = Interaction; Foc = Focus; I = Input; O = Output; Fu = Function; Fo = Form.
Appendix C: Bibliography


Chunking Norms Chart 3

Input Form

- **Above mean score**
- **Mean to 1.5 sd below**
- **Less than 1.5 sd below**

<table>
<thead>
<tr>
<th>Age</th>
<th>Above Mean Score</th>
<th>Mean to 1.5 sd Below</th>
<th>Less than 1.5 sd Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>5;6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8;7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10;10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13;10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Input Function

Above mean score
Mean to 1.5 sd below
Less than 1.5 sd below

5;6
8;7
10;10
13;10
Above mean score
Mean to 1.5 sd below
Less than 1.5 sd below
Interaction Norms Chart 2

Output Function

- **Above mean score**
- **Mean to 1.5 sd below**
- **Less than 1.5 sd below**

<table>
<thead>
<tr>
<th>Function</th>
<th>5;6</th>
<th>8;7</th>
<th>10;10</th>
<th>13;10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above</td>
<td>60</td>
<td>40</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Mean to 1.5 sd below</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Less than 1.5 sd below</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Interaction Norms Chart 3

Input Form

<table>
<thead>
<tr>
<th>Score Category</th>
<th>5;6</th>
<th>8;7</th>
<th>10;10</th>
<th>13;10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above mean score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean to 1.5 sd below</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1.5 sd below</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interaction Norms Chart 4

Output Form

Above mean score

Mean to 1.5 sd below

Less than 1.5 sd below

5;6
8;7
10;10
13;10
Above mean score
Mean to 1.5 sd below
Less than 1.5 sd below
Above mean score
Mean to 1.5 sd below
Less than 1.5 sd below
Above mean score

Mean to 1.5 sd below

Less than 1.5 sd below