**Appendices**

**Appendix A**

**Table A:** Demographics of individuals with aphasia (WAB=Western Aphasia Battery (Kertesz, 1982); BNT = Boston Naming Test (Kaplan et al., 1883) VNT= Verb Naming Test (Cho-Reyes & Thompson, 2012)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Aphasia****Bank ID** | **Gender** | **Age** | **Diagnosis** | **Fluency** | **WAB-AQ (max. 100)** | **Boston Naming Test (n=60)** | **Verb Naming Test (n=22)** |
| 1 | ACWT01a | F | 69.09 | BRO | nfl | 63.9 | 50 | 22 |
| 2 | ACWT03a | M | 68.01 | BRO | nfl | 69.3 | 56 | 21 |
| 3 | ACWT05a | M | 75.06 | BRO | nfl | 57.7 | 55 | 8 |
| 4 | ACWT11a | M | 61.07 | WER | flu | 48.9 | 44 | 13 |
| 5 | ACWT12a  | F | 83.01 | CON | nfl | 79.5 | 58 | 21 |
| 6 | Adler02a | M | 69.08 | CON | flu | 74.9 | 46 | 7 |
| 7 | BU01a | M | 62.06 | ANO | flu | 85.7 | 59 | 21 |
| 8 | BU09a | M | 78.05 | CON | flu | 65.3 | 31 | 16 |
| 9 | elman02a | F | 81.11 | BRO | nfl | 61.7 | 33 | 7 |
| 10 | TCU05a | F | 70.04 | ANO | flu | 92.0 | 60 | 22 |
| 11 | whiteside02a | F | 74.06 | CON | flu | 60.7 | 22 | 5 |
| 12 | adler25a | M | 66.02 | BRO | nfl | 77.6 | 60 | 18 |
| 13 | elman06a | F | 76.09 | BRO | nfl | 45.5 | 12 | 2 |
| 14 | adler09a | F | 41.07 | ANO | flu | 92.8 | 52 | 21 |
| 15 | kansas21a | M | 60.09 | CON | flu | 77.2 | 58 | 20 |
| 16 | kansas10a | M | 77.00 | CON | flu | 61.4 | 20 | 19 |
| 17 | scale22a | M | 73.07 | ANO | flu | 90.4 | 58 | 22 |
| 18 | williamson11a | F | 64.08 | BRO | nfl | 69.0 | 45 | 18 |
| 19 | tap11a | F | 62.07 | BRO | nfl | 58.1 | 20 | 9 |
| 20 | star03a | M | 85.07 | ANO | flu | 75.1 | 26 | 4 |
| 21 | scale08a | M | 72.08 | ANO | flu | 87.9 | 50 | 18 |
| 22 | tucson08a | F | 56.06 | CON | flu | 73.4 | 54 | 14 |
| 23 | tucson01a | M | 76.10 | ANO | flu | 92.8 | 60 | 22 |
| 24 | elman14a | F | 76.03 | CON | flu | 65.7 | 37 | 7 |
| 25 | kempler03 | M | 64.05 | BRO | nfl | 60.7 | 4 | 17 |
| 26 | garrett01a | F | 76.07 | WER | flu | 52.4 | 14 | 4 |
| 27 | MSU1a | M | 79.09 | ANO | flu | 89.6 | 56 | 19 |
| 28 | MSU08a | F | 75.05 | CON | flu | 60.5 | 30 | 5 |
| 29 | MSU05a | M | 72.09 | BRO | nfl | 68.2 | 37 | 6 |
| 30 | Scale23a | F | 57.05 | CON | flu | 64.5 | 46 | 18 |
| 31 | kurland13a | M | 55.00 | BRO | nfl | 54.0 | 42 | 11 |
| 32 | scale01a | M | 78.03 | BRO | nfl | 52.5 | 30 | 7 |
| 33 | scale10a | M | 44.07 | BRO | nfl | 63.5 | 56 | 15 |
| 34 | scale11a | F | 90.07 | WER | flu | 65.9 | 27 | 10 |
| 35 | scale13a | M | 70.02 | BRO | nfl | 70.1 | 46 | 10 |
| 36 | fridriksson07a | F | 78.00 | ANO | flu | 92.6 | 60 | 21 |
| 37 | williamson19a | F | 52.07 | BRO | nfl | 69.4 | 53 | 12 |
| 38 | williamson10a | M | 72.00 | NCL | flu | 95.2 | 60 | 22 |
| 39 | whiteside14a | F | 42.06 | BRO | nfl | 71.8 | 58 | 14 |
| 40 | tucson15b | M | 79.00 | CON | flu | 57.8 | 42 | 13 |
| 41 | thompson11a | F | 79.03 | ANO | nfl | 81.4 | 57 | 8 |
| 42 | thompson07a | M | 70.00 | BRO | nfl | 93.4 | 60 | 20 |
| 43 | thompson04a | F | 79.06 | ANO | flu | 74.4 | 53 | 14 |
| 44 | kurland09a | F | 80.06 | TCS | flu | 79.9 | 48 | 16 |
| 45 | fridriksson06a | M | 50.04 | BRO | nfl | 49.0 | 44 | 10 |
| 46 | kansas07a | F | 77.04 | ANO | flu | 96.1 | 60 | 22 |
| 47 | adler03a | F | 78.04 | ANO | flu | 93.8 | 60 | 22 |
| 48 | ACWT07a  | M | 61.05 | ANO | nfl | 95.0 | 60 | 21 |
| 49 | ACWT02a | F | 51.01 | BRO | nfl | 74.6 | 56 | 22 |
| 50 | kurland07a | F | 70.06 | ANO | flu | 83.0 | 58 | 9 |

**Appendix B:**

**Appendix B:** List of 57 phrases that have been identified as concepts and percentage of unimpaired participants who mentioned each of these concepts

|  |  |  |
| --- | --- | --- |
| **#** | **Concepts** | **%** |
| 1 | The man climbed/ is in the tree | 98 |
| 2 | Man wants to get the cat [\*plausible motivation to climb the tree] | 74 |
| 3 | Man used ladder [Man/ Ladder \*plausible action] | 54 |
| 4 | The man comes  | 24 |
| 5 | The man is very upset | 2 |
| 6 | The man looks foolish | 4 |
| 7 | The situation messed the father up | 2 |
| 8 | The man thinks he is a squirrel | 2 |
| 9 | The man called the girl | 2 |
| 10 | The girl is concerned [\*negative emotional state of the girl] | 38 |
| 11 | The girl is calling the cat | 8 |
| 12 | The girl wants the cat to come down [\*motivation of the girl] | 30 |
| 13 | The girl has a cat | 4 |
| 14 | The girl is standing there [\*plausible location] | 32 |
| 15 | The girl was playing outside [\*plausible action] | 34 |
| 16 | The girl has a bike | 12 |
| 17 | The girl gets help (e.g., calling the father) | 30 |
| 18 | The girl is happy | 2 |
| 19 | The girl runs home | 2 |
| 20 | The girl found her dad | 2 |
| 21 | The girl has a dog | 2 |
| 22 | The girl got a ladder | 2 |
| 23 | The girl came in | 2 |
| 24 | The girl came back out | 2 |
| 25 | The cat climbed/ is in the tree | 96 |
| 26 | The cat is a family cat | 2 |
| 27 | The cat wanted to get the bird [\*motivation of the cat] | 38 |
| 28 | The cat was following the girl | 2 |
| 29 | The dog is barking [\*making noise] | 52 |
| 30 | The dog was not successful n helping the cat | 2 |
| 31 | The dog is excited [\*motivation of the dog] | 20 |
| 32 | The dog settles down | 2 |
| 33 | The dog comes | 16 |
| 34 | The dog will walk away | 2 |
| 35 | The dog's barking alerted the neighbours | 2 |
| 36 | The dog is trying to climb the tree | 2 |
| 37 | The dog looks up the tree | 2 |
| 38 | The fire brigade is coming [\*arrival at the scene] | 94 |
| 39 | The fire brigade rescues them [\*help/resuce] | 96 |
| 40 | The fire brigade is trained in ladder rescues | 2 |
| 41 | The fire brigade brings a ladder | 68 |
| 42 | The fire brigade climbed up the tree/ up the ladder/ got up the tree | 6 |
| 43 | The fire brigade deals with the dog | 4 |
| 44 | Someone must have called the fire brigade | 66 |
| 45 | The ladder is lost | 72 |
| 46 | The ladder is there | 4 |
| 47 | They didn't use the ladder | 2 |
| 48 | The bird is singing | 14 |
| 49 | The bird is sitting there [\*location] | 16 |
| 50 | The bird would fly away | 2 |
| 51 | The bird is just acting like a bird | 2 |
| 52 | The bird doesn't care [\*mental state] | 6 |
| 53 | The people come over | 2 |
| 54 | The people want to help the cat | 2 |
| 55 | Someone must have seen the dilemma | 4 |
| 56 | The mother is looking out of the window | 2 |
| 57 | The mother is back in the house | 2 |

**Appendix C: Calculating the difference-in-order (DiO) ratio**

We generated a matrix to compare the main concept order of each individual with aphasia to the median main concept order (see Table C).

Table C: Comparison matrix to evaluate the extent to which an individual concept order differed from the median concept order of unimpaired individuals.

|  |  |
| --- | --- |
| Example | Median Concept Order |
| A | B | C | D | E | F | G | H | I | J |
| Individual Participant Concept Order | H | Median Concept Order | A | - | **1** | **0** | **1** |  | **0** |  | **0** | **0** | **1** |
| I | B | - | - | 0 | 0 | 0 | 0 | 0 | 1 |
| F | C | - | - | - | 1 | 0 | 0 | 0 | 1 |
| C | D | - | - | - | - | 0 | 0 | 0 | 1 |
|  | E |  |  |  |
| A | F | - | - | - | - | - | 0 | 0 | 1 |
|  | G |  |  |  |
| D | H | - | - | - | - | - | - | 1 | 1 |
| B | I | - | - | - | - | - | - | - | 1 |
| J | J | - | - | - | - | - | - | - | - |

The top row of the matrix represents the median main concept order in the form of letters from A to J. The actual concept order of the individual with aphasia was represented in the first column of the matrix. In the example illustrated in Table 1 the participant produced concept H before concept I followed by concept F, C, A, D, B, and J. If a main concept was missing in an individual’s picture description (here: concept E and G) the rows and columns of the corresponding concepts were disregarded for the analysis (e.g., see shading of columns and rows for concepts E and G in Table 1). The second column represented once again the concepts in the median concept order from unimpaired participants and was used to score order. We identified differences in the order of main concepts by comparing the main concepts that should have followed a particular main concept (e.g. A) according to the median order (B, C, D, E, F, G, H, I, J) with the main concepts that actually followed it in the participant’s picture description (see example in Table 1: D, B, J). To indicate that an individual with aphasia produced concept A before concept B, we entered a “1” in the cell that corresponded to the intersection of A in the second column (concept produced by individual with aphasia) and with the B in the first row (concept that should be produced after A, according to the median concept order). The participant in the Table 1 example produced concept A before concept B. Hence, a “1” was entered in the corresponding cell “AB” (see Table 1, shaded green).

When we found that a participant produced a specific main concept (e.g., A) in a different position relative to the median main concept order (e.g., individual produced A after C, see example Table 1) we entered a “0” in the corresponding cell (see Table 1; cell “AC” shaded red). The example in Table 1 illustrates this further. Here, the participant produced the concept A before B, D and J (coded with “1” in cells AB, AD, AJ; see Table 1; green numbers), but after the concepts C, F, H and I (coded with “0” in cells AC, AF, AH, AI; see Table 1; red numbers).

This matrix enabled us to calculate a *difference-in-order ratio* for each participant in this study. This ratio was calculated as follows:

1. Total number of possible differences in order (based on the number of main concepts that were produced)
2. Total number of observed differences (corresponding to number of “0”s in the matrix)
3. Difference-in-order ratio =$ \frac{Total number of actual differences }{Total number of possible differences}$

The closer the difference-in-order ratio was to 1.00, the larger the participant’s deviation from the median concept order of unimpaired speakers.

The participant in the Table 1 example produced eight different main concepts (A, B, C, D, F, H, I, J) which resulted in a total of 28 possible differences in order (corresponding to the total number of cells that can be filled in the matrix.) The number of actual differences that occurred in the participant’s picture description was 16 (corresponding to number of zeros in the matrix). The difference-in-order ratio for this particular participant in Table 1 is hence: 16/28 = 0.57.