Online Appendices

Appendix A

Spanish Pillai Values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Participant | **bapa** | **bepa** | **bipa** | **bopa** | **bupa** |
| Heritage Speaker 1 | 0.2024 | 0.2158 | 0.2412 | 0.2035 | 0.251 |
| Heritage Speaker 2 | 0.2265 | 0.2006 | 0.2533 | 0.2216 | 0.2502 |
| Heritage Speaker 3 | 0.2316 | 0.1929 | 0.2687 | 0.2263 | 0.2230 |
| Heritage Speaker 4 | 0.5098 | 0.3142 | 0.3948 | 0.4381 | 0.2395 |
| Heritage Speaker 5 | 0.5011 | 0.3116 | 0.4003 | 0.4425 | 0.2225 |
| Heritage Speaker 6 | 0.4924 | 0.3090 | 0.4057 | 0.447 | 0.2055 |
| Heritage Speaker 7 | 0.2367 | 0.1851 | 0.2841 | 0.2311 | 0.2376 |
| Heritage Speaker 8 | 0.2418 | 0.2161 | 0.2687 | 0.1943 | 0.3672 |
| Heritage Speaker 9 | 0.2428 | 0.2385 | 0.2652 | 0.1908 | 0.2081 |
| Heritage Speaker 10 | 0.1937 | 0.2137 | 0.2270 | 0.2079 | 0.2340 |
| Heritage Speaker 11 | 0.2300 | 0.2110 | 0.2325 | 0.2124 | 0.2170 |
| Heritage Speaker 12 | 0.5737 | 0.338 | 0.3345 | 0.3753 | 0.3139 |
| Heritage Speaker 13 | 0.5650 | 0.3353 | 0.3745 | 0.3798 | 0.2969 |
| Heritage Speaker 14 | 0.5563 | 0.3327 | 0.4084 | 0.3842 | 0.28 |
| Heritage Speaker 15 | 0.2213 | 0.2084 | 0.2379 | 0.2168 | 0.2773 |

English Pillai Values

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Lax vowels | | | | | Tense vowels | | | | |
| Participant | hat | head | hit | hook | hut | hate | heed | hole | hot | who'd |
| H. Speaker 1 | 0.1499 | 0.5472 | 0.7041 | 0.6045 | 0.5865 | 0.1281 | 0.1891 | 0.1130 | 0.4555 | 0.0834 |
| H. Speaker 2 | 0.0484 | 0.4801 | 0.5156 | 0.5856 | 0.7103 | 0.0857 | 0.1099 | 0.0658 | 0.7585 | 0.0953 |
| H. Speaker 3 | 0.0613 | 0.2584 | 0.3082 | 0.2305 | 0.2845 | 0.1467 | 0.1124 | 0.1712 | 0.2406 | 0.2392 |
| H. Speaker 4 | 0.2198 | 0.1545 | 0.2719 | 0.2309 | 0.2420 | 0.2126 | 0.1847 | 0.2088 | 0.2578 | 0.1781 |
| H. Speaker 5 | 0.1698 | 0.1721 | 0.3074 | 0.2839 | 0.2854 | 0.2168 | 0.1972 | 0.2032 | 0.2592 | 0.1326 |
| H. Speaker 6 | 0.1698 | 0.2341 | 0.2282 | 0.2062 | 0.3322 | 0.2278 | 0.2097 | 0.2215 | 0.2057 | 0.1559 |
| H. Speaker 7 | 0.2017 | 0.5662 | 0.6359 | 0.3832 | 0.5517 | 0.1746 | 0.1026 | 0.1769 | 0.4310 | 0.1674 |
| H. Speaker 8 | 0.0613 | 0.4994 | 0.5148 | 0.4094 | 0.5483 | 0.1077 | 0.1000 | 0.1524 | 0.5243 | 0.1914 |
| H. Speaker 9 | 0.1998 | 0.5241 | 0.5832 | 0.5699 | 0.5406 | 0.1747 | 0.1194 | 0.1050 | 0.3937 | 0.1732 |
| H. Speaker 10 | 0.1519 | 0.4288 | 0.6082 | 0.5487 | 0.4613 | 0.1627 | 0.0594 | 0.1178 | 0.5565 | 0.1825 |
| H. Speaker. 11 | 0.0269 | 0.5651 | 0.5715 | 0.4807 | 0.5512 | 0.0747 | 0.1806 | 0.0964 | 0.6575 | 0.1094 |
| H. Speaker 12 | 0.1598 | 0.1363 | 0.2824 | 0.2681 | 0.2544 | 0.2063 | 0.1438 | 0.2168 | 0.2308 | 0.1465 |
| H. Speaker 13 | 0.2148 | 0.1454 | 0.2771 | 0.2495 | 0.2482 | 0.2095 | 0.1353 | 0.2128 | 0.2443 | 0.1623 |
| H. Speaker 14 | 0.2698 | 0.1545 | 0.2719 | 0.2309 | 0.2420 | 0.2126 | 0.1269 | 0.2088 | 0.2578 | 0.1781 |
| H. Speaker 15 | 0.0850 | 0.2064 | 0.2395 | 0.2577 | 0.2809 | 0.1857 | 0.1151 | 0.1075 | 0.1965 | 0.1175 |

Appendix B

Word list

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| English Vowels |  |  |  |  |
| /i/ |  |  |  |  |
| /ɪ/ |  |  |  |  |
| /e/ |  |  |  |  |
| /ɛ/ |  |  |  |  |
| /æ/ |  |  |  |  |
| /ɑ/ |  |  |  |  |
| /ʌ/ |  |  |  |  |
| /ʊ/ |  |  |  |  |
| /o/ |  |  |  |  |
| /u/ |  |  |  |  |
| **Spanish Vowels** |  |  |  |  |
| /i/ | silla | hija | diga | bipa |
| /e/ | tela | beso | mesa | bepa |
| /a/ | tapa | casa | daba | bapa |
| /o/ | lobo | nodo | ropa | bopa |
| /u/ | pudo | duda | muda | bupa |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| English |  |  | Spanish |  |  |
| /i/ | /ɑ/ |  | /a/ | /u/ |  |
| beepa | boppa |  | bapa | bupa |  |
| keeper | bomber |  | bapo | bupo |  |
| leader | bother |  | casa | duda |  |
| needer | father |  | daba | muda |  |
| /ɪ/ | /ʌ/ |  | /e/ | /o/ |  |
| bippa | buppa |  | bepa | bopa |  |
| bitter | butter |  | bepo | bopo |  |
| fitter | mutter |  | besa | lobo |  |
| hitter | rubber |  | cera | nodo |  |
| /e/ | /ʊ/ |  | /i/ |  |  |
| bepa | bupa |  | bipa |  |  |
| rabies | supper |  | silla |  |  |
| paler | looker |  | hija |  |  |
| railing | footer |  | diga |  |  |
| /ɛ/ | /o/ |  |  |  |  |
| bepper | bopa |  |  |  |  |
| header | loader |  |  |  |  |
| pepper | motor |  |  |  |  |
| redder | roader |  |  |  |  |
| /æ/ | /u/ |  |  |  |  |
| bapa | boopa |  |  |  |  |
| catty | bootie |  |  |  |  |
| daddy | foodie |  |  |  |  |
| happy | ruder |  |  |  |  |

Online Appendix C

Words for picture naming task

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *English* | |  |  | *Spanish* | |  | | |  |
|  | Word | Log Frequency | Number of letters |  | Word | Log Frequency | | | Number of letters |
| 1 | tree | 1.80 | 4 |  | ojos | | 2.685 | 4 | | |
| 2 | truck | 1.09 | 5 |  | cabeza | | 2.547 | 6 | | |
| 3 | glass | 1.98 | 5 |  | manos | | 2.452 | 5 | | |
| 4 | train | 1.91 | 5 |  | puerta | | 2.443 | 6 | | |
| 5 | table | 2.29 | 5 |  | dinero | | 2.316 | 6 | | |
| 6 | skirt | 1.18 | 5 |  | sol | | 2.270 | 3 | | |
| 7 | shoe | 1.10 | 4 |  | boca | | 2.191 | 4 | | |
| 8 | boat | 1.73 | 4 |  | cama | | 2.136 | 4 | | |
| 9 | shirt | 1.44 | 5 |  | pie | | 2.124 | 3 | | |
| 10 | bird | 1.61 | 4 |  | brazos | | 2.006 | 6 | | |
| 11 | pen | 1.36 | 3 |  | fuego | | 1.908 | 5 | | |
| 12 | orange | 1.44 | 6 |  | jardín | | 1.797 | 6 | | |
| 13 | nose | 1.62 | 4 |  | lluvia | | 1.779 | 6 | | |
| 14 | lion | 1.12 | 4 |  | pan | | 1.743 | 3 | | |
| 15 | knife | 1.44 | 5 |  | dedo | | 1.713 | 4 | | |
| 16 | hand | 2.54 | 4 |  | reloj | | 1.711 | 5 | | |
| 17 | heart | 2.14 | 5 |  | avión | | 1.708 | 5 | | |
| 18 | ear | 1.46 | 3 |  | llave | | 1.375 | 5 | | |
| 19 | egg | 1.41 | 3 |  | pez | | 1.216 | 3 | | |
| 20 | dog | 1.91 | 3 |  | casa | | 2.798 | 4 | | |