

# Do children laugh like their parents?

## Conversational laughter mimicry occurrence and acoustic alignment in middle-childhood

### Supplementary Material

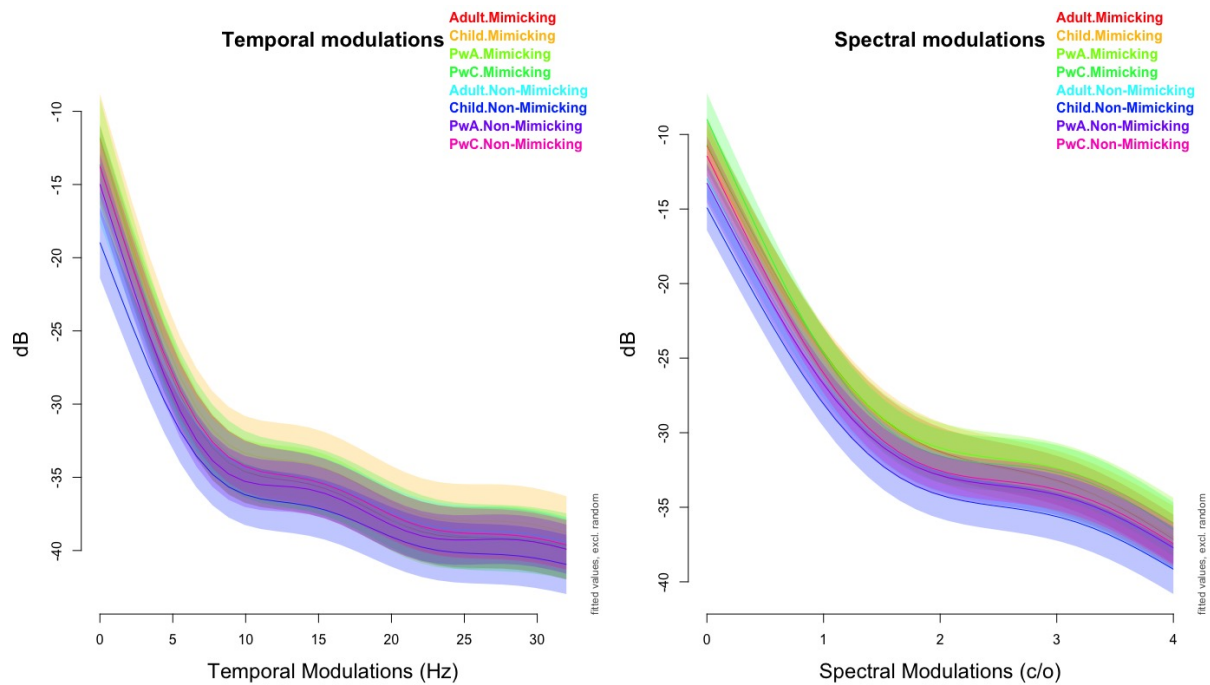


Figure 1: Fitted class models for temporal (Left) and spectral (Right) modulations across interlocutor and laughter type interactions.

Table 1: Model overview for temporal modulations across interlocutor (Adult; PwA: Parent interacting with Adult; PwC: Parent interacting with Child; Child) and laughter (M: Mimicking; NM: Non-Mimicking) type interactions.

| <i>Intercept</i>           | <i>estimates</i> | <i>SE</i>     | <i>t</i> | <i>p</i> |
|----------------------------|------------------|---------------|----------|----------|
| Intercept                  | -37.48           | 0.37          | -102.4   | ***      |
| Adult.M                    | -0.19            | 0.83          | -0.23    | n.s      |
| Adult.NM                   | -0.14            | 0.76          | 0.18     | n.s      |
| PwA.M                      | 0.07             | 0.73          | 0.1      | n.s      |
| PwA.NM                     | -0.43            | 0.66          | -0.65    | n.s      |
| PwC.M                      | 0.6              | 0.75          | 0.8      | n.s      |
| Child.M                    | 1.39             | 0.95          | 1.46     | n.s      |
| Child.NM                   | -1.85            | 0.87          | -2.13    | *        |
| <i>Fixed smooth terms</i>  | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v):Adult.M               | 8.78             | 8.97          | 106.42   | ***      |
| s(v):Adult.NM              | 8.89             | 8.99          | 243.56   | ***      |
| s(v):PwA.M                 | 8.81             | 8.98          | 116.29   | ***      |
| s(v):PwA.NM                | 8.93             | 8.99          | 296.05   | ***      |
| s(v):PwC.M                 | 8.62             | 8.94          | 72.84    | ***      |
| s(v):PwC.NM                | 8.89             | 8.99          | 263.15   | ***      |
| s(v):Child.M               | 8.64             | 8.95          | 65.85    | ***      |
| s(v):Child.NM              | 8.84             | 8.98          | 166.31   | ***      |
| <i>Random smooth terms</i> | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v,p):M                   | 68.57            | 215.0         | 4.22     | ***      |
| s(v,p):NM                  | 72.51            | 217.0         | 5.95     | ***      |

Table 2: Model overview for spectral modulations across interlocutor (Adult; PwA: Parent interacting with Adult; PwC: Parent interacting with Child; Child) and laughter (M: Mimicking; NM: Non-Mimicking) type interactions

| <i>Intercept</i>           | <i>estimates</i> | <i>SE</i>     | <i>t</i> | <i>p</i> |
|----------------------------|------------------|---------------|----------|----------|
| Intercept                  | -43.43           | 0.34          | -126.21  | ***      |
| Adult.M                    | -0.09            | 0.76          | -0.12    | n.s      |
| Adult.NM                   | -0.31            | 0.72          | -0.43    | n.s      |
| PwA.M                      | 1.05             | 0.68          | 1.55     | n.s      |
| PwA.NM                     | -0.27            | 0.63          | -0.42    | n.s      |
| PwC.M                      | 1.07             | 0.7           | 1.52     | n.s      |
| Child.M                    | 0.47             | 0.88          | 0.54     | n.s      |
| Child.NM                   | -2.1             | 0.82          | -2.65    | *        |
| <i>Fixed smooth terms</i>  | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v):Adult.M               | 8.9              | 9.0           | 390.52   | ***      |
| s(v):Adult.NM              | 8.96             | 9.0           | 1092.63  | ***      |
| s(v):PwA.M                 | 8.889            | 9.0           | 341.73   | ***      |
| s(v):PwA.NM                | 8.96             | 9.0           | 1095.82  | ***      |
| s(v):PwC.M                 | 8.9              | 9.0           | 334.87   | ***      |
| s(v):PwC.NM                | 8.96             | 9.0           | 1090.14  | ***      |
| s(v):Child.M               | 8.77             | 9.0           | 217.28   | ***      |
| s(v):Child.NM              | 8.94             | 9.0           | 765.66   | ***      |
| <i>Random smooth terms</i> | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v,p):M                   | 37.85            | 216.0         | 1.84     | ***      |
| s(v,p):NM                  | 46.79            | 219.0         | 2.64     | ***      |

Table 3: Arousal model overview for Child temporal modulations across arousal (H: High and Medium; L: Low) laughter (M: Mimicking; NM: Non-Mimicking) type interactions.

| <i>Intercept</i>           | <i>estimates</i> | <i>SE</i>     | <i>t</i> | <i>p</i> |
|----------------------------|------------------|---------------|----------|----------|
| Intercept                  | -26.24           | 0.82          | -32.0    | ***      |
| H.M                        | 3.13             | 0.91          | 3.45     | ***      |
| L.M                        | -1.58            | 1.3           | -1.22    | n.s      |
| H.NM                       | 2.42             | 0.83          | 2.92     | **       |
| <i>Fixed smooth terms</i>  | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v'):H.M                  | 4.62             | 5.81          | 9.22     | ***      |
| s(v'):L.M                  | 2.44             | 3.13          | 5.55     | ***      |
| s(v'):H.NM                 | 6.29             | 7.49          | 103.8    | ***      |
| s(v'):L.M                  | 3.74             | 4.8           | 125.27   | ***      |
| <i>Random smooth terms</i> | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v',p'):M                 | 10.58            | 54.0          | 1.11     | ***      |
| s(v',p'):NM                | 3.83             | 56.0          | 0.36     | ***      |

Table 4: Arousal model overview for spectral modulations for each interlocutor type (Adult; PwA: Parent interacting with Adult; PwC: Parent interacting with Child; Child) across arousal (H: High and Medium; L: Low) laughter (M: Mimicking; NM: Non-Mimicking) type interactions.

| <i>Intercept</i>           | Participant | <i>estimates</i> | <i>SE</i>     | <i>t</i> | <i>p</i> |
|----------------------------|-------------|------------------|---------------|----------|----------|
| Intercept                  | Adult       | -20.35           | 0.74          | -27.49   | ***      |
|                            | PwA         | -22.64           | 0.4           | -56.55   | ***      |
|                            | PwC         | -18.57           | 0.66          | -28.36   | ***      |
|                            | Child       | -25.79           | 0.88          | -29.33   | ***      |
| H.M                        | Adult       | 2.71             | 0.84          | 3.24     | **       |
|                            | PwA         | 1.74             | 0.44          | 3.9      | ***      |
|                            | PwC         | 2.76             | 0.67          | 4.1      | ***      |
|                            | Child       | 2.45             | 0.91          | 2.69     | **       |
| L.M                        | Adult       | -1.08            | 1.22          | -0.89    | n.s      |
|                            | PwA         | -1.25            | 0.46          | -2.69    | **       |
|                            | PwC         | -1.31            | 0.82          | -1.6     | n.s      |
|                            | Child       | -0.49            | 1.14          | -0.43    | n.s      |
| H.NM                       | Adult       | 1.88             | 0.74          | 2.55     | *        |
|                            | PwA         | 1.36             | 0.3866        | 3.51     | ***      |
|                            | PwC         | 1.36             | 0.64          | 2.12     | *        |
|                            | Child       | 1.73             | 0.85          | 2.03     | *        |
| <i>Fixed smooth terms</i>  | Participant | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v'):H.M                  | Adult       | 1.95             | 2.0           | 34.66    | ***      |
|                            | PwA         | 1.0              | 1.0           | 679.92   | ***      |
|                            | PwC         | 1.0              | 1.0           | 253.02   | ***      |
|                            | Child       | 6.45             | 6.92          | 29.56    | ***      |
| s(v'):L.M                  | Adult       | 1.86             | 1.98          | 13.33    | ***      |
|                            | PwA         | 2.34             | 2.87          | 155.38   | ***      |
|                            | PwC         | 1.0              | 1.0           | 95.93    | ***      |
|                            | Child       | 5.66             | 6.55          | 10.82    | ***      |
| s(v'):H.NM                 | Adult       | 1.0              | 1.0           | 296.28   | ***      |
|                            | PwA         | 1.0              | 1.0           | 570.73   | ***      |
|                            | PwC         | 1.98             | 2.0           | 399.35   | ***      |
|                            | Child       | 6.83             | 6.99          | 206.63   | ***      |
| s(v'):L.M                  | Adult       | 1.0              | 1.0           | 346.04   | ***      |
|                            | PwA         | 1.0              | 1.0           | 725.41   | ***      |
|                            | PwC         | 1.98             | 2.0           | 286.76   | ***      |
|                            | Child       | 6.82             | 6.99          | 231.92   | ***      |
| <i>Random smooth terms</i> | Participant | <i>edf</i>       | <i>ref.df</i> | <i>F</i> | <i>p</i> |
| s(v',p'):M                 | Adult       | 5.45             | 16.0          | 1.2      | **       |
|                            | PwA         | 22.18            | 33.0          | 9.13     | ***      |
|                            | PwC         | 6.49             | 10.0          | 7.75     | ***      |
|                            | Child       | 8.87             | 46.0          | 2.12     | ***      |
| s(v',p'):NM                | Adult       | 9.88             | 16.0          | 7.01     | ***      |
|                            | PwA         | 31.575           | 38.0          | 30.83    | ***      |
|                            | PwC         | 4.1e-05          | 22.0          | 0.0      | n.s      |
|                            | Child       | 6.84             | 46.0          | 0.88     | *        |

Table 5: Laughter excluded for the alignment analysis taking a duration threshold greater than 0.5 seconds across dyads (PA: Parent-Adult; Parent-Child).

| <i>Dyad Type</i> | <i>Participant</i> | <i>File</i> | <i>Duration</i> | <i>ID</i> |
|------------------|--------------------|-------------|-----------------|-----------|
| PA               | Adult              | AA-D1.eaf   | 0.48            | D1_A_01   |
| PA               | Adult              | AA-D2.eaf   | 0.403           | D2_A_27   |
| PA               | Parent             | AA-D2.eaf   | 0.345           | D2_PwA_41 |
| PA               | Parent             | AA-D4.eaf   | 0.34            | D4_PwA_05 |
| PA               | Parent             | AA-D5.eaf   | 0.238           | D5_PwA_04 |
| PA               | Parent             | AA-D5.eaf   | 0.49            | D5_PwA_20 |
| PA               | Adult              | AA-D7.eaf   | 0.37            | D7_A_11   |
| PA               | Parent             | AA-D7.eaf   | 0.382           | D7_PwA_21 |
| PC               | Parent             | CA-D5.eaf   | 0.34            | D5_PwC_02 |
| PC               | Parent             | CA-D5.eaf   | 0.41            | D5_PwC_10 |
| PC               | Child              | CA-D8.eaf   | 0.495           | D8_C_07   |
| PC               | Child              | CA-D8.eaf   | 0.36            | D8_C_10   |
| PC               | Child              | CA-D8.eaf   | 0.497           | D8_C_11   |
| PC               | Child              | CA-D6.eaf   | 0.401           | D6_C_26   |
| PC               | Parent             | CA-D6.eaf   | 0.437           | D6_PwC_13 |
| PC               | Parent             | CA-D1.eaf   | 0.45            | D1_PwC_02 |