**APPENDIX**

Summary of statistics

Hearing in Noise Test (Figure 3A)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | S0-  Ndiffuse | S0-  Ndiscrete | S0Ndiffuse-BBF | S90-  Ndiffuse | S180-  Ndiffuse |
| P-value  (t-statistic) | Interaction  Term | **0.0152**  **(-2.51)** | **0.0209**  **(-2.38)** | **0.0112**  **(-2.63)** | **0.0096**  **(-2.69)** | **<.0001**  **(-7.95)** |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | **<.0001**  **(-2.02)**  **(d=0.14)** | 0.6123  (1.23)  (d=0.09) | **0.0157**  **(3.10)**  **(d=0.24)** | **0.0013**  **(3.96)**  **(d=0.26)** | **<.0001**  **(13.06)**  **(d=1.14)** |
| Basic-On vs. Basic-Off | **<.0001**  **(5.03)**  **(d=0.40)** | **<.0001**  **(9.82)**  **(d=0.79)** | **0.0007**  **(4.14)**  **(d=0.32)** | 0.1027  (-2.34)  (d=0.19) | **<.0001**  **(-6.01)**  **(d=0.52)** |
| Premium-On vs. Premium-Off | **<.0001**  **(10.59)**  **(d=0.62)** | **<.0001**  **(12.42)**  **(d=1.02)** | **<.0001**  **(8.38)**  **(d=0.59)** | 0.7944  (0.92)  (d=0.06) | **<.0001**  **(6.09)**  **(d=0.45)** |
| Premium-Off vs. Basic-Off | 0.5419  (-1.34)  (d=0.08) | 0.0867  (-2.41)  (d=0.14) | 0.9649  (-0.47)  (d=0.03) | 0.9994  (0.12)  (d=0.01) | 0.0628  (2.56)  (d=0.18) |

Paired comparisons: Listening effort (Figure 4A)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | S0N0-  babble | S0-reverberation | S0N0-transient | S0N180-wind | S0N180-babble |
| P-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.7917  (-0.27)  (d=0.04) | 0.3512  (0.94)  (d=0.13) | 0.3217  (-1.00)  (d=0.14) | **<.0001**  **(7.78)**  **(d=1.06)** | 0.4417  (0.78)  (d=0.11) |
| Basic-On vs. chance level | **<.0001**  **(9.57)**  **(d=1.30)** | 0.1861  (1.34)  (d=0.18) | 0.6153  (0.51)  (d=0.07) | 0.1119  (-1.62)  (d=0.22) | **<.0001**  **(46.25)**  **(d=6.29)** |
| Premium-On vs. chance level | **<.0001**  **(9.54)**  **(d=1.30)** | 0.7705  (0.29)  (d=0.04) | **0.0375**  **(2.13)**  **(d=0.29)** | **<.0001**  **(-8.25)**  **(d=1.12)** | **<.0001**  **(39.86)**  **(d=5.42)** |

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Scale ratings: Listening effort (Figure 4B)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | S0N0-  babble | S0-reverberation | S0N0-transient | S0N180-wind | S0N180-babble |
| P-value  (t-statistic) | Interaction  Term | **0.0446**  **(2.06)** | 0.5632  (0.58) | 0.8303  (0.22) | 0.4488  (-0.76) | 0.0576  (1.94) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.1391  (-2.19)  (d=0.19) | 0.9934  (0.27)  (d=0.02) | 0.6819  (1.12)  (d=0.08) | 0.8435  (0.82)  (d=0.05) | 0.5508  (-1.33)  (d=0.12) |
| Basic-On vs. Basic-Off | 0.9999  (-0.06)  (d=0.00) | 0.9639  (0.48)  (d=0.03) | 0.9499  (0.54)  (d=0.04) | 0.6643  (-1.14)  (d=0.09) | **0.0024**  **(-3.75)**  **(d=0.29)** |
| Premium-On vs. Premium-Off | **0.0038**  **(-3.60)**  **(d=0.25)** | 0.9764  (-0.41)  (d=0.03) | 0.9882  (0.32)  (d=0.02) | 0.9942  (-0.25)  (d=0.02) | **<.0001**  **(-7.09)**  **(d=0.52)** |
| Premium-Off vs. Basic-Off | 0.888  (0.72)  (d=0.06) | 0.7009  (1.08)  (d=0.07) | 0.2978  (1.77)  (d=0.10) | 0.9906  (-0.30)  (d=0.02) | 0.5616  (1.31)  (d=0.11) |

Paired comparisons: Sound quality (Figure 4C)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | S0N0-  babble | S0-reverberation | S0N0-transient | S0N180-wind | S0N180-babble |
| P-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.5391  (-0.62)  (d=0.08) | 0.3585  (0.93)  (d=0.13) | **<.0001**  **(-5.25)**  **(d=0.72)** | **<.0001**  **(9.96)**  **(d=1.35)** | 0.9055  (0.12)  (d=0.02) |
| Basic-On vs. chance level | **<.0001**  **(9.19)**  **(d=1.25)** | 0.2874  (1.07)  (d=0.15) | **0.0051**  **(-2.92)**  **(d=0.40)** | 0.9526  (0.060)  (d=0.01) | **<.0001**  (38.80)  (d=5.28) |
| Premium-On vs. chance level | **<.0001**  **(10.03)**  **(d=1.36)** | 0.7254  (-0.35)  (d=0.05) | **<.0001**  **(5.14)**  **(d=0.70)** | **<.0001**  **(-12.56)**  **(d=1.71)** | **<.0001**  (45.99)  (d=6.26) |

Scale ratings: Sound quality (Figure 4D)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | S0N0-  babble | S0-reverberation | S0N0-transient | S0N180-wind | S0N180-babble |
| P-value  (t-statistic) | Interaction  Term | 0.5688  (0.57) | 0.3204  (-1.00) | 0.7136  (0.37) | 0.0812  (-1.78) | 0.1757  (1.37) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.7261  (-1.04)  (d=0.08) | 0.4231  (1.54)  (d=0.10) | 1  (0.02)  (d=0.00) | 0.9877  (0.33)  (d=0.02) | 0.4931  (-1.42)  (d=0.10) |
| Basic-On vs. Basic-Off | 0.5750  (-1.29)  (d=0.10) | 1.00  (-0.02)  (d=0.00) | 0.9811  (0.38)  (d=0.03) | 0.2466  (-1.89)  (d=0.15) | **0.0038**  **(-3.60)**  **(d=0.28)** |
| Premium-On vs. Premium-Off | 0.0933  (-2.38)  (d=0.16) | 0.5248  (1.37)  (d=0.08) | 1  (-0.04)  (d=0.00) | 0.9907  (0.30)  (d=0.02) | **<.0001**  **(-5.63)**  **(d=0.43)** |
| Premium-Off vs. Basic-Off | 0.9699  (-0.45)  (d=0.03) | 0.9847  (0.35)  (d=0.02) | 0.9626  (0.48)  (d=0.03) | 0.2134  (-1.97)  (d=0.15) | 0.9536  (0.52)  (d=0.04) |

Localization test (Figure 3B)

|  |  |  |
| --- | --- | --- |
|  |  | Front/back localization |
| P-value  (t-statistic) | Interaction Term | **0.0329**  **(2.19)** |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.1419  (-2.18)  (d=0.17) |
| Basic-On vs. Basic-Off | 0.5084  (-1.39)  (d=0.10) |
| Premium-On vs. Premium-Off | **0.0015**  **(-3.90)**  **(d=0.32)** |
| Premium-Off vs. Basic-Off | 0.9360  (0.59)  (d=0.05) |

Retrospective self-reports (Figure 5)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | APHAB-Global and SSQ-Speech | SSQ-Effort | APHAB-AV | SSQ-Qualities | SSQ-Spatial | SADL-Global |
| P-value  (t-statistic) | Interaction  Term | 0.0581  (1.94) | 0.2389  (1.19) | 0.1083  (1.63) | 0.1039  (1.65) | 0.4212  (0.81) | 0.9045  (-0.12) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.4247  (-1.53)  (d=0.07) | 0.3229  (-1.72)  (d=0.08) | 0.9841  (0.36)  (d=0.02) | 0.4789  (-1.44)  (d=0.07) | 0.7022  (-1.08)  (d=0.05) | 0.7277  (-1.04)  (d=0.05) |
| Basic-On vs. Basic-Off | 0.6076  (-1.24)  (d=0.05) | 0.99  (-0.31)  (d=0.02) | 0.9204  (-0.63)  (d=0.03) | 0.9001  (0.69)  (d=0.04) | 0.9348  (-0.59)  (d=0.03) | **0.0066**  **(-3.41)**  **(d=0.18)** |
| Premium-On vs. Premium-Off | **<.0001**  **(-4.79)**  **(d=0.16)** | 0.0847  (-2.42)  (d=0.11) | **0.0208**  **(-3.00)**  **(d=0.16)** | 0.1382  (-2.19)  (d=0.09) | 0.3198  (-1.73)  (d=0.07) | **0.0065**  **(-3.42)**  **(d=0.17)** |
| Premium-Off vs. Basic-Off | 0.7049  (1.08)  (d=0.04) | 0.9985  (0.16)  (d=0.01) | **0.0356 (2.79)**  **(0.15)** | 0.6481  (1.17)  (d=0.06) | 0.9992  (-0.13)  (d=0.01) | 0.5557  (-1.32)  (d=0.06) |

In-situ self-reports: EMA-Speech (Figure 6A)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | 0.7528  (-0.32) | 0.5883  (-0.54) | 0.4222  (-0.80) | 0.5017  (-0.65) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.5331  (-1.35)  (d=0.06) | 0.5782  (-1.28)  (d=0.07) | 0.9588  (-0.50)  (d=0.06) | 0.7935  (0.92)  (d=0.23) |
| Basic-On vs. Basic-Off | 1  (-0.05)  (d=0.00) | 0.687  (-1.10)  (d=0.06) | 0.5124  (-1.38)  (d=0.16) | 0.1074  (-2.28)  (d=0.55) |
| Premium-On vs. Premium-Off | 0.9794  (0.39)  (d=0.02) | 0.9851  (-0.35)  (d=0.02) | 0.9926  (-0.28)  (d=0.03) | 0.4018  (-1.57)  (d=0.34) |
| Premium-Off vs. Basic-Off | 0.3085  (-1.73)  (d=0.08) | 0.1547  (-2.10)  (d=0.11) | 0.3698  (-1.62)  (d=0.19) | 0.9998  (0.08)  (d=0.02) |

In-situ self-reports: EMA-Effort (Figure 6B)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | **0.0113**  **(2.53)** | 0.7389  (-0.33) | 0.0933  (1.68) | 0.4325  (0.79) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.9341  (-0.59)  (d=0.02) | 0.9991  (0.13)  (d=0.01) | 0.9988  (-0.15)  (d=0.02) | 0.584  (-1.27)  (d=0.28) |
| Basic-On vs. Basic-Off | 0.2951  (1.76)  (d=0.07) | 0.9999  (-0.07)  (d=0.00) | 0.3891  (1.58)  (d=0.18) | **0.03**  **(2.79)**  **(d=0.62)** |
| Premium-On vs. Premium-Off | 0.2605  (-1.83)  (d=0.08) | 0.9787  (0.40)  (d=0.02) | 0.858  (-0.79)  (d=0.08) | 0.1949  (1.99)  (d=0.39) |
| Premium-Off vs. Basic-Off | **0.0179**  **(2.93)**  **(d=0.12)** | 0.9868  (-0.34)  (d=0.02) | 0.1147  (2.24)  (d=0.25) | 0.9937  (-0.26)  (d=0.05) |

In-situ self-reports: EMA-Loudness (Figure 6C)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | 0.4835  (-0.70) | **0.0023**  **(3.05)** | 0.2003  (-1.28) | 0.9021  (0.12) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.5056  (1.39)  (d=0.05) | **0.013**  **(-3.03)**  **(d=0.15)** | 0.9528  (0.53)  (d=0.05) | 0.9997  (0.10)  (d=0.02) |
| Basic-On vs. Basic-Off | **0.0135**  **(-3.02)**  **(d=0.11)** | 0.7081  (1.07)  (d=0.05) | **0.0091**  **(-3.15)**  **(d=0.31)** | 0.5118  (-1.38)  (d=0.30) |
| Premium-On vs. Premium-Off | 0.1866  (-2.00)  (d=0.08) | **0.0065**  **(-3.25)**  **(d=0.16)** | 0.4883  (-1.42)  (d=0.13) | 0.283  (-1.79)  (d=0.33) |
| Premium-Off vs. Basic-Off | 0.9827  (0.37)  (d=0.01) | 0.6273  (1.20)  (d=0.06) | 0.5678  (-1.29)  (d=0.13) | 0.9903  (0.30)  (d=0.06) |

In-situ self-reports: EMA-Localization (Figure 6D)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | 0.4006  (0.84) | 0.8825  (0.15) | **0.0009**  **(-3.34)** | 0.0767  (-1.78) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.1299  (-2.18)  (d=0.07) | 0.9994  (-0.12)  (d=0.01) | 0.0565  (2.53)  (d=0.23) | 0.1131  (2.25)  (d=0.46) |
| Basic-On vs. Basic-Off | 0.7123  (-1.06)  (d=0.04) | 0.6168  (-1.22)  (d=0.05) | **0.003**  **(-3.48)**  **(d=0.32)** | **0.0164**  **(-2.99)**  **(d=0.62)** |
| Premium-On vs. Premium-Off | 0.1139  (-2.24)  (d=0.08) | 0.4709  (-1.45)  (d=0.06) | 0.6075  (1.23)  (d=0.11) | 0.8611  (-0.79)  (d=0.14) |
| Premium-Off vs. Basic-Off | 0.7859  (-0.94)  (d=0.03) | 0.9997  (0.09)  (d=0.00) | 0.1221  (-2.21)  (d=0.20) | 0.9996  (-0.10)  (d=0.02) |

In-situ self-reports: EMA-Satisfaction (Figure 6E)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | 0.1049  (-1.62) | **0.0152**  **(2.43)** | 0.5017  (-0.67) | 0.1169  (-1.57) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.4414  (1.49)  (d=0.05) | 0.1429  (-2.13)  (d=0.10) | 0.4819  (-1.43)  (d=0.13) | 0.8759  (0.75)  (d=0.15) |
| Basic-On vs. Basic-Off | **<.0001**  **(-5.04)**  **(d=0.17)** | 0.094  (-2.32)  (d=0.11) | **<.0001**  **(-4.44)**  **(d=0.42)** | **0.0002**  **(-4.25)**  **(d=0.87)** |
| Premium-On vs. Premium-Off | **0.0348**  **(-2.70)**  **(d=0.09)** | **<.0001**  **(-5.81)**  **(d=0.26)** | **0.0017**  **(-3.64)**  **(d=0.33)** | 0.051  (-2.58)  (d=0.45) |
| Premium-Off vs. Basic-Off | 0.8515  (-0.81)  (d=0.03) | 0.5926  (1.25)  (d=0.06) | 0.08  (-2.39)  (d=0.22) | 0.4042  (-1.56)  (d=0.27) |

In-situ self-reports: EMA-Global (Figure 6F)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Quiet | Somewhat Noisy | Noisy | Very Noisy |
| P-value  (t-statistic) | Interaction  Term | 0.1274  (-1.52) | 0.0617  (1.87) | **0.0427**  **(-2.03)** | 0.126  (-1.54) |
| Tukey-Kramer adjusted p-value  (t-statistic)  (effect size) | Premium-On vs. Basic-On | 0.9866  (0.34)  (d=0.01) | 0.2756  (-1.80)  (d=0.09) | 0.9763  (0.41)  (d=0.04) | 0.5415  (1.34)  (d=0.28) |
| Basic-On vs. Basic-Off | **0.0012**  **(-3.71)**  **(d=0.12)** | 0.7962  (-0.92)  (d=0.04) | **0.0004**  **(-4.00)**  **(d=0.41)** | **0.0006**  **(-3.99)**  **(d=0.83)** |
| Premium-On vs. Premium-Off | 0.4213  (-1.53)  (d=0.05) | **0.0019**  **(-3.59)**  **(d=0.17)** | 0.6222  (-1.21)  (d=0.12) | 0.0998  (-2.31)  (d=0.41) |
| Premium-Off vs. Basic-Off | 0.2804  (-1.79)  (d=0.06) | 0.8527  (0.80)  (d=0.04) | 0.0653  (-2.47)  (d=0.25) | 0.8489  (-0.81)  (d=0.14) |