**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) |