The Memorability of People: Intrinsic Memorability across Transformations of a Person

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Supplementary Material

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S1— Table of HR data for each identity

Average hit rate (HR) for the image pairs for each identity (#1-13 from KDEF, #14-32 from ESRC). N=neutral, H=happy, A=angry, 3=3/4 view, P=profile view.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | N-N | H-H | A-A | 3-3 | P-P | N-H | N-A | N-3 | N-P | H-N | A-N | 3-N | P-N | Range | M |
| 1 | 0.61 | 0.58 | 0.63 | 0.87 | 0.73 | 0.56 | 0.64 | 0.74 | 0.72 | 0.49 | 0.57 | 0.59 | 0.49 | 0.38 | 0.63 |
| 2 | 0.68 | 0.59 | 0.81 | 0.63 | 0.52 | 0.46 | 0.65 | 0.82 | 0.65 | 0.31 | 0.49 | 0.47 | 0.35 | 0.50 | 0.57 |
| 3 | 0.84 | 0.77 | 0.71 | 0.75 | 0.71 | 0.44 | 0.57 | 0.67 | 0.65 | 0.70 | 0.67 | 0.41 | 0.26 | 0.57 | 0.63 |
| 4 | 0.65 | 0.74 | 0.76 | 0.70 | 0.75 | 0.50 | 0.58 | 0.59 | 0.70 | 0.78 | 0.69 | 0.46 | 0.32 | 0.46 | 0.63 |
| 5 | 0.56 | 0.70 | 0.72 | 0.70 | 0.64 | 0.44 | 0.51 | 0.64 | 0.67 | 0.49 | 0.56 | 0.51 | 0.38 | 0.34 | 0.58 |
| 6 | 0.61 | 0.79 | 0.68 | 0.44 | 0.59 | 0.69 | 0.58 | 0.47 | 0.71 | 0.63 | 0.58 | 0.50 | 0.50 | 0.35 | 0.60 |
| 7 | 0.53 | 0.61 | 0.82 | 0.64 | 0.67 | 0.47 | 0.47 | 0.54 | 0.59 | 0.52 | 0.52 | 0.48 | 0.33 | 0.48 | 0.55 |
| 8 | 0.70 | 0.78 | 0.76 | 0.57 | 0.46 | 0.35 | 0.65 | 0.41 | 0.57 | 0.48 | 0.46 | 0.64 | 0.62 | 0.43 | 0.57 |
| 9 | 0.44 | 0.65 | 0.69 | 0.71 | 0.74 | 0.51 | 0.48 | 0.40 | 0.56 | 0.35 | 0.49 | 0.25 | 0.41 | 0.49 | 0.51 |
| 10 | 0.69 | 0.83 | 0.83 | 0.83 | 0.64 | 0.67 | 0.77 | 0.64 | 0.74 | 0.60 | 0.44 | 0.58 | 0.52 | 0.38 | 0.67 |
| 11 | 0.79 | 0.68 | 0.86 | 0.80 | 0.74 | 0.53 | 0.70 | 0.72 | 0.76 | 0.68 | 0.77 | 0.57 | 0.48 | 0.39 | 0.70 |
| 12 | 0.77 | 0.85 | 0.84 | 0.63 | 0.70 | 0.60 | 0.74 | 0.66 | 0.66 | 0.55 | 0.45 | 0.46 | 0.54 | 0.40 | 0.65 |
| 13 | 0.79 | 0.75 | 0.62 | 0.65 | 0.56 | 0.63 | 0.51 | 0.64 | 0.64 | 0.43 | 0.42 | 0.41 | 0.31 | 0.48 | 0.57 |
| 14 | 0.59 | 0.73 | 0.70 | 0.77 | 0.62 | 0.62 | 0.54 | 0.61 | 0.66 | 0.67 | 0.73 | 0.55 | 0.50 | 0.27 | 0.64 |
| 15 | 0.75 | 0.58 | 0.63 | 0.88 | 0.59 | 0.49 | 0.71 | 0.63 | 0.66 | 0.50 | 0.42 | 0.43 | 0.24 | 0.63 | 0.58 |
| 16 | 0.73 | 0.81 | 0.72 | 0.84 | 0.96 | 0.63 | 0.65 | 0.56 | 0.76 | 0.67 | 0.60 | 0.44 | 0.37 | 0.60 | 0.67 |
| 17 | 0.74 | 0.68 | 0.69 | 0.81 | 0.86 | 0.66 | 0.73 | 0.74 | 0.65 | 0.72 | 0.54 | 0.53 | 0.55 | 0.34 | 0.68 |
| 18 | 0.83 | 0.84 | 0.86 | 0.71 | 0.83 | 0.81 | 0.68 | 0.77 | 0.70 | 0.81 | 0.77 | 0.86 | 0.50 | 0.36 | 0.77 |
| 19 | 0.86 | 0.83 | 0.78 | 0.86 | 0.65 | 0.65 | 0.77 | 0.75 | 0.60 | 0.76 | 0.89 | 0.71 | 0.58 | 0.31 | 0.75 |
| 20 | 0.54 | 0.56 | 0.59 | 0.48 | 0.58 | 0.48 | 0.41 | 0.47 | 0.54 | 0.61 | 0.34 | 0.36 | 0.31 | 0.29 | 0.48 |
| 21 | 0.84 | 0.83 | 0.73 | 0.85 | 0.81 | 0.73 | 0.67 | 0.85 | 0.66 | 0.86 | 0.76 | 0.63 | 0.57 | 0.29 | 0.75 |
| 22 | 0.60 | 0.74 | 0.70 | 0.51 | 0.63 | 0.77 | 0.53 | 0.39 | 0.58 | 0.45 | 0.59 | 0.43 | 0.25 | 0.52 | 0.55 |
| 23 | 0.42 | 0.59 | 0.69 | 0.44 | 0.54 | 0.70 | 0.48 | 0.49 | 0.68 | 0.26 | 0.29 | 0.27 | 0.23 | 0.47 | 0.47 |
| 24 | 0.71 | 0.72 | 0.84 | 0.81 | 0.60 | 0.61 | 0.77 | 0.72 | 0.72 | 0.51 | 0.59 | 0.47 | 0.56 | 0.37 | 0.66 |
| 25 | 0.63 | 0.58 | 0.79 | 0.61 | 0.62 | 0.42 | 0.61 | 0.64 | 0.64 | 0.62 | 0.49 | 0.45 | 0.40 | 0.39 | 0.58 |
| 26 | 0.52 | 0.59 | 0.63 | 0.51 | 0.65 | 0.50 | 0.51 | 0.74 | 0.81 | 0.65 | 0.65 | 0.54 | 0.42 | 0.38 | 0.59 |
| 27 | 0.54 | 0.48 | 0.71 | 0.66 | 0.70 | 0.49 | 0.88 | 0.52 | 0.51 | 0.59 | 0.48 | 0.49 | 0.46 | 0.42 | 0.58 |
| 28 | 0.42 | 0.63 | 0.59 | 0.76 | 0.51 | 0.45 | 0.54 | 0.61 | 0.68 | 0.54 | 0.51 | 0.36 | 0.29 | 0.47 | 0.53 |
| 29 | 0.69 | 0.52 | 0.73 | 0.80 | 0.79 | 0.61 | 0.69 | 0.60 | 0.63 | 0.42 | 0.63 | 0.40 | 0.38 | 0.42 | 0.61 |
| 30 | 0.62 | 0.72 | 0.69 | 0.68 | 0.55 | 0.63 | 0.75 | 0.68 | 0.65 | 0.52 | 0.57 | 0.31 | 0.37 | 0.44 | 0.60 |
| 31 | 0.78 | 0.75 | 0.84 | 0.76 | 0.88 | 0.66 | 0.45 | 0.71 | 0.63 | 0.92 | 0.70 | 0.66 | 0.56 | 0.47 | 0.71 |
| 32 | 0.96 | 0.90 | 0.81 | 0.88 | 0.74 | 0.72 | 0.73 | 0.61 | 0.62 | 0.85 | 0.74 | 0.67 | 0.33 | 0.63 | 0.74 |
| M | 0.67 | 0.70 | 0.73 | 0.70 | 0.67 | 0.58 | 0.62 | 0.63 | 0.65 | 0.59 | 0.58 | 0.50 | 0.42 | 0.43 | 0.62 |
| SD | 0.14 | 0.11 | 0.08 | 0.13 | 0.12 | 0.11 | 0.12 | 0.12 | 0.07 | 0.16 | 0.14 | 0.13 | 0.11 | 0.09 | 0.08 |
|  |  |  | Change-change avg. | 0.70 |  | Neutral-change avg. | 0.62 |  | Change-neutral avg. | 0.52 |  |  |

S2— Table of FAR data for each identity

Average false alarm rate (FAR) for the images for each identity (#1-13 from KDEF, #14-32 from ESRC). N=neutral, H=happy, A=angry, 3=3/4 view, P=profile view.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| # | N | H | A | 3 | P | Range | M |
| 1 | 0.34 | 0.41 | 0.33 | 0.51 | 0.30 | 0.21 | 0.38 |
| 2 | 0.23 | 0.24 | 0.22 | 0.30 | 0.32 | 0.09 | 0.26 |
| 3 | 0.22 | 0.09 | 0.23 | 0.24 | 0.24 | 0.15 | 0.21 |
| 4 | 0.25 | 0.26 | 0.32 | 0.13 | 0.17 | 0.19 | 0.23 |
| 5 | 0.14 | 0.22 | 0.11 | 0.24 | 0.18 | 0.12 | 0.18 |
| 6 | 0.35 | 0.18 | 0.27 | 0.17 | 0.21 | 0.18 | 0.24 |
| 7 | 0.12 | 0.15 | 0.13 | 0.18 | 0.22 | 0.09 | 0.16 |
| 8 | 0.31 | 0.28 | 0.33 | 0.19 | 0.15 | 0.18 | 0.25 |
| 9 | 0.10 | 0.07 | 0.19 | 0.08 | 0.09 | 0.12 | 0.10 |
| 10 | 0.29 | 0.33 | 0.44 | 0.42 | 0.41 | 0.15 | 0.38 |
| 11 | 0.32 | 0.32 | 0.33 | 0.43 | 0.43 | 0.11 | 0.37 |
| 12 | 0.30 | 0.35 | 0.30 | 0.28 | 0.45 | 0.18 | 0.34 |
| 13 | 0.21 | 0.26 | 0.22 | 0.28 | 0.32 | 0.11 | 0.26 |
| 14 | 0.33 | 0.18 | 0.24 | 0.35 | 0.21 | 0.16 | 0.26 |
| 15 | 0.19 | 0.32 | 0.29 | 0.44 | 0.29 | 0.25 | 0.30 |
| 16 | 0.23 | 0.14 | 0.33 | 0.21 | 0.30 | 0.19 | 0.24 |
| 17 | 0.27 | 0.28 | 0.23 | 0.30 | 0.33 | 0.11 | 0.28 |
| 18 | 0.33 | 0.27 | 0.16 | 0.29 | 0.25 | 0.17 | 0.26 |
| 19 | 0.30 | 0.35 | 0.47 | 0.37 | 0.25 | 0.23 | 0.35 |
| 20 | 0.13 | 0.05 | 0.08 | 0.11 | 0.12 | 0.08 | 0.10 |
| 21 | 0.09 | 0.11 | 0.13 | 0.11 | 0.06 | 0.07 | 0.10 |
| 22 | 0.19 | 0.12 | 0.06 | 0.06 | 0.28 | 0.22 | 0.14 |
| 23 | 0.16 | 0.14 | 0.20 | 0.15 | 0.21 | 0.07 | 0.17 |
| 24 | 0.32 | 0.39 | 0.51 | 0.43 | 0.37 | 0.18 | 0.40 |
| 25 | 0.15 | 0.20 | 0.30 | 0.16 | 0.23 | 0.15 | 0.21 |
| 26 | 0.24 | 0.28 | 0.43 | 0.23 | 0.29 | 0.19 | 0.29 |
| 27 | 0.22 | 0.20 | 0.41 | 0.15 | 0.30 | 0.27 | 0.26 |
| 28 | 0.18 | 0.08 | 0.23 | 0.20 | 0.21 | 0.15 | 0.18 |
| 29 | 0.16 | 0.20 | 0.26 | 0.15 | 0.14 | 0.12 | 0.18 |
| 30 | 0.24 | 0.34 | 0.32 | 0.16 | 0.41 | 0.25 | 0.30 |
| 31 | 0.13 | 0.08 | 0.12 | 0.11 | 0.20 | 0.12 | 0.13 |
| 32 | 0.07 | 0.06 | 0.01 | 0.02 | 0.04 | 0.06 | 0.04 |
| M | 0.22 | 0.22 | 0.26 | 0.23 | 0.25 | 0.04 | 0.24 |
| SD | 0.08 | 0.10 | 0.12 | 0.12 | 0.10 | 0.04 | 0.09 |

S3— Table of *d´* data for each identity

Average *d´* for the image pairs for each identity (#1-13 from KDEF, #14-32 from ESRC). N=neutral, H=happy, A=angry, 3=3/4 view, P=profile view.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | N-N | H-H | A-A | 3-3 | P-P | N-H | N-A | N-3 | N-P | H-N | A-N | 3-N | P-N | Range | M |
| 1 | 1.01 | 0.83 | 0.85 | 1.21 | 1.00 | 0.38 | 0.44 | 1.42 | 0.96 | -0.13 | 0.55 | 0.09 | 0.62 | 1.55 | 0.71 |
| 2 | 1.18 | 1.30 | 1.76 | 0.86 | 0.58 | 0.77 | 1.18 | 1.77 | 0.85 | -0.05 | 0.60 | 0.46 | 0.05 | 1.82 | 0.87 |
| 3 | 2.02 | 2.60 | 1.59 | 1.51 | 1.11 | 0.37 | 1.21 | 1.02 | 1.15 | 1.54 | 0.93 | 0.34 | 0.25 | 2.35 | 1.20 |
| 4 | 1.06 | 1.70 | 1.46 | 1.72 | 1.54 | 0.84 | 0.64 | 0.82 | 1.36 | 1.12 | 0.73 | 0.93 | 0.60 | 1.12 | 1.12 |
| 5 | 1.18 | 1.16 | 2.42 | 1.56 | 1.05 | 1.08 | 0.98 | 1.61 | 1.38 | 0.91 | 1.00 | 0.51 | 0.85 | 1.91 | 1.21 |
| 6 | 0.48 | 1.80 | 1.31 | 0.94 | 1.07 | 0.88 | 0.49 | 0.31 | 1.20 | 1.17 | 0.58 | 0.84 | 0.81 | 1.49 | 0.91 |
| 7 | 1.54 | 1.61 | 2.36 | 1.39 | 1.49 | 1.14 | 0.96 | 1.06 | 1.38 | 0.85 | 0.92 | 0.77 | 0.15 | 2.21 | 1.20 |
| 8 | 1.21 | 1.31 | 1.02 | 0.91 | 0.98 | 0.07 | 0.72 | 0.18 | 0.72 | 0.58 | 0.50 | 1.37 | 1.34 | 1.29 | 0.84 |
| 9 | 1.22 | 2.23 | 1.46 | 1.84 | 1.96 | 1.40 | 1.18 | 1.01 | 1.44 | 0.84 | 0.79 | 0.83 | 1.19 | 1.44 | 1.34 |
| 10 | 1.03 | 1.75 | 1.34 | 1.20 | 0.70 | 1.27 | 1.39 | 0.85 | 0.93 | 0.38 | -0.25 | 0.32 | 0.17 | 2.00 | 0.85 |
| 11 | 1.60 | 0.96 | 1.74 | 1.21 | 0.82 | 0.47 | 0.88 | 1.08 | 1.06 | 0.89 | 1.01 | 0.16 | 0.09 | 1.65 | 0.92 |
| 12 | 1.61 | 1.79 | 1.80 | 1.04 | 0.88 | 0.74 | 1.03 | 0.88 | 0.84 | 0.19 | 0.15 | 0.38 | -0.01 | 1.81 | 0.87 |
| 13 | 1.80 | 1.40 | 1.05 | 1.05 | 0.76 | 1.06 | 0.73 | 1.11 | 1.19 | 0.35 | 0.60 | 0.26 | -0.15 | 1.96 | 0.86 |
| 14 | 0.76 | 1.84 | 1.21 | 1.11 | 0.95 | 0.64 | 0.61 | 0.69 | 0.83 | 1.09 | 1.32 | 0.55 | 1.02 | 1.29 | 0.97 |
| 15 | 1.53 | 0.89 | 0.85 | 1.19 | 0.93 | 0.92 | 1.41 | 1.25 | 1.30 | 0.26 | 0.37 | 0.11 | -0.27 | 1.79 | 0.83 |
| 16 | 1.48 | 2.36 | 1.18 | 1.89 | 2.41 | 0.95 | 1.04 | 0.87 | 1.51 | 1.25 | 0.55 | 0.54 | 0.11 | 2.30 | 1.24 |
| 17 | 1.64 | 1.26 | 1.49 | 1.53 | 1.44 | 0.88 | 1.15 | 1.49 | 0.68 | 1.00 | 0.65 | 0.46 | 0.63 | 1.18 | 1.10 |
| 18 | 1.67 | 1.97 | 2.32 | 0.92 | 1.81 | 1.32 | 0.62 | 1.32 | 0.91 | 1.19 | 1.57 | 1.81 | 0.52 | 1.79 | 1.38 |
| 19 | 1.95 | 1.40 | 1.18 | 1.59 | 0.93 | 1.00 | 1.14 | 1.31 | 0.50 | 1.05 | 0.95 | 0.67 | 1.06 | 1.46 | 1.13 |
| 20 | 1.93 | 1.62 | 2.02 | 1.23 | 1.18 | 0.80 | 0.92 | 1.03 | 1.16 | 2.32 | 0.74 | 0.85 | 0.99 | 1.58 | 1.29 |
| 21 | 2.84 | 2.30 | 2.09 | 2.27 | 2.38 | 1.81 | 1.39 | 2.65 | 1.78 | 2.18 | 1.60 | 1.59 | 1.75 | 1.46 | 2.05 |
| 22 | 1.73 | 2.49 | 1.93 | 2.14 | 0.99 | 1.57 | 0.85 | 0.38 | 0.99 | 0.66 | 1.96 | 1.03 | -0.16 | 2.65 | 1.27 |
| 23 | 0.65 | 1.54 | 1.12 | 0.95 | 1.10 | 1.32 | 1.11 | 1.15 | 1.47 | 0.25 | 0.54 | 0.37 | -0.14 | 1.68 | 0.88 |
| 24 | 1.20 | 1.09 | 1.25 | 1.16 | 0.46 | 0.48 | 1.36 | 0.98 | 1.01 | 0.10 | -0.06 | 0.02 | 0.61 | 1.42 | 0.74 |
| 25 | 1.74 | 0.95 | 1.50 | 1.16 | 0.96 | 0.82 | 1.23 | 1.41 | 1.21 | 1.21 | 0.35 | 0.98 | 0.56 | 1.39 | 1.08 |
| 26 | 0.80 | 0.93 | 0.52 | 0.87 | 0.95 | 0.75 | 0.76 | 1.44 | 1.40 | 0.87 | 0.57 | 0.71 | 0.33 | 1.12 | 0.84 |
| 27 | 1.21 | 1.06 | 0.54 | 1.49 | 0.82 | 0.72 | 1.80 | 0.57 | 0.89 | 0.87 | 0.41 | 0.99 | 0.66 | 1.40 | 0.92 |
| 28 | 0.90 | 1.71 | 1.06 | 1.67 | 0.92 | 0.77 | 0.74 | 1.58 | 1.20 | 1.62 | 0.69 | 0.37 | 0.17 | 1.53 | 1.03 |
| 29 | 1.66 | 1.86 | 1.52 | 2.11 | 1.93 | 1.32 | 1.42 | 1.16 | 1.24 | 0.16 | 0.77 | 0.59 | 0.77 | 1.95 | 1.27 |
| 30 | 1.20 | 0.96 | 1.21 | 1.59 | 0.34 | 1.08 | 1.20 | 1.01 | 1.19 | 0.47 | 0.40 | 0.40 | -0.11 | 1.70 | 0.84 |
| 31 | 2.09 | 2.21 | 2.06 | 2.50 | 2.21 | 1.74 | 1.18 | 1.50 | 1.10 | 2.72 | 1.84 | 1.28 | 0.89 | 1.84 | 1.79 |
| 32 | 3.07 | 2.98 | 3.22 | 3.29 | 2.22 | 2.17 | 1.71 | 2.16 | 1.92 | 2.39 | 2.73 | 2.59 | 1.54 | 1.75 | 2.46 |
| M | 1.47 | 1.62 | 1.51 | 1.47 | 1.21 | 0.98 | 1.05 | 1.16 | 1.15 | 0.95 | 0.81 | 0.72 | 0.53 | 1.09 | 1.13 |
| SD | 0.57 | 0.56 | 0.58 | 0.55 | 0.56 | 0.45 | 0.33 | 0.50 | 0.31 | 0.72 | 0.60 | 0.55 | 0.53 | 0.41 | 0.52 |
|  |  |  | Change-change avg. | 1.45 |  | Neutral-change avg. | 1.08 |  | Change-neutral avg. | 0.75 |  |  |

S4— Distributions of HR and FAR



(Above) A histogram of HR distributions across all of the images.

(Below) A histogram of FAR distributions across all of the images.

S5— Average hit rates for image pair types



The average hit rates (HRs) for each image pair, grouped by pair type. The dotted line represents the baseline, or the average HR for neutral-neutral. Each pair type shows its average HR with the transparent thick-lined bar, and inside the bar is the respective average HR for each pair (with happy, angry, 3/4-view, or profile view). Asterisks indicate a significant difference from the neutral baseline. For example, all of the pairs in “Change to Neutral” (happy-neutral, angry-neutral, 3/4-neutral, and profile-neutral) are significantly different from the baseline. Error bars indicate standard error of the mean.

S6— Subsampled consistency analysis

The average consistency (*r*), and the significance of that consistency versus a chance distribution (*p*) for hit rate (HR), false alarm rate (FAR), and *d´* for each image pair in the experiment based on the 1000-iteration split half ranking consistency analysis. Here, the participants were subsampled so only the data from approximately 40% of the participants were used (so there were approximately 35 observers per image), and the averaged results of 100 random subsamples are shown here. Despite the limited number of participants, consistency still remains significantly high (*p* < 0.05)for most measures and image pairs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **HR** | **FAR** | **d´** |
| **Image Pair** | *r* | *p* | *r* | *p* | *r* | *p* |
| Neutral-neutral | 0.48 | 0.010 | 0.46 | 0.014 | 0.38 | 0.024 |
| Happy-happy | 0.48 | 0.010 | 0.51 | 0.008 | 0.45 | 0.014 |
| Angry-angry | 0.30 | 0.135 | 0.56 | 0.002 | 0.52 | 0.002 |
| 3/4-3/4 | 0.53 | 0.004 | 0.58 | 0.001 | 0.39 | 0.035 |
| Profile-profile | 0.39 | 0.050 | 0.47 | 0.013 | 0.46 | 0.010 |
| Neutral-happy | 0.38 | 0.046 | 0.51 | 0.007 | 0.25 | 0.180 |
| Neutral-angry | 0.41 | 0.033 | 0.49 | 0.009 | 0.34 | 0.041 |
| Neutral-3/4 | 0.36 | 0.075 | 0.41 | 0.032 | 0.39 | 0.028 |
| Neutral-profile | 0.08 | 0.602 | 0.42 | 0.032 | 0.14 | 0.433 |
| Happy-neutral | 0.55 | 0.003 | 0.57 | 0.002 | 0.56 | 0 |
| Angry-neutral | 0.41 | 0.044 | 0.58 | 0.001 | 0.52 | 0.003 |
| 3/4-neutral | 0.41 | 0.036 | 0.59 | 0.001 | 0.43 | 0.009 |
| Profile-neutral | 0.41 | 0.039 | 0.56 | 0.002 | 0.54 | 0.003 |
|  |  |  |  |  |  |  |
| Same Image Average | 0.44 |  | 0.52 |  | 0.44 |  |
| Different Image Average | 0.38 |  | 0.52 |  | 0.40 |  |
| Overall Average | 0.40 |  | 0.52 |  | 0.41 |  |

S7— Attribute M and SDs by image type

The mean (M) and standard deviation (SD) of the ratings of the twenty image attributes rated for the different image types. Ratings here are all along a 9-point Likert scale, ranging from 1 (*not at all*) to 9 (*extremely*), based on the first attribute listed in each antonym pair. Cells with a gray background have a significantly high consistency for that attribute and image type (Main Text Table 2, *p* < 0.05). Rows with a blue background indicate an attribute with significantly high within-image consistency for all image types.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Neutral | Happy | Angry | 3/4 | Profile |
| **Attribute** | M | SD | M | SD | M | SD | M | SD | M | SD |
| typical / atypical | 5.49 | 1.81 | 5.87 | 1.80 | 4.70 | 1.96 | 5.74 | 1.83 | 5.95 | 1.79 |
| interesting / boring | 4.67 | 1.90 | 5.77 | 2.00 | 5.04 | 2.10 | 4.74 | 1.98 | 4.41 | 1.92 |
| calm / aggressive | 5.65 | 2.07 | 6.86 | 1.87 | 3.18 | 1.80 | 6.13 | 2.01 | 6.22 | 1.88 |
| caring / cold | 4.52 | 1.97 | 6.95 | 1.69 | 3.36 | 1.79 | 4.95 | 1.99 | 4.94 | 1.89 |
| common/ uncommon | 5.72 | 1.87 | 6.04 | 1.82 | 5.12 | 1.97 | 6.09 | 1.88 | 6.26 | 1.71 |
| confident / uncertain | 5.06 | 2.00 | 6.48 | 1.74 | 4.87 | 2.05 | 5.26 | 1.95 | 5.16 | 1.89 |
| humble / egotistic | 5.19 | 1.97 | 6.10 | 1.86 | 4.07 | 1.97 | 5.56 | 1.87 | 5.55 | 1.90 |
| emotionally stable / unstable | 5.18 | 1.96 | 6.42 | 1.87 | 3.72 | 1.88 | 5.72 | 1.91 | 5.71 | 1.87 |
| memorable / forgettable | 4.41 | 1.94 | 5.08 | 2.03 | 5.02 | 2.00 | 4.41 | 2.01 | 4.07 | 1.95 |
| intelligent / unintelligent | 5.77 | 1.72 | 6.31 | 1.75 | 4.98 | 1.76 | 6.16 | 1.62 | 5.94 | 1.67 |
| sociable / introverted | 4.36 | 1.91 | 6.58 | 1.77 | 4.13 | 2.19 | 4.57 | 1.94 | 4.57 | 1.86 |
| kind / mean | 5.05 | 1.98 | 7.22 | 1.56 | 3.27 | 1.76 | 5.54 | 1.95 | 5.58 | 1.94 |
| responsible / irresponsible | 5.55 | 1.80 | 6.45 | 1.67 | 4.59 | 1.85 | 6.09 | 1.71 | 5.87 | 1.72 |
| trustworthy / untrustworthy | 5.07 | 1.90 | 6.46 | 1.78 | 4.05 | 1.90 | 5.66 | 1.83 | 5.53 | 1.79 |
| attractive / unattractive | 4.86 | 2.01 | 5.48 | 2.01 | 3.94 | 2.00 | 5.31 | 1.94 | 4.95 | 1.91 |
| emotional / unemotional | 4.54 | 2.11 | 6.17 | 2.01 | 6.56 | 1.95 | 4.61 | 2.09 | 4.47 | 2.01 |
| familiar / unfamiliar | 4.73 | 2.00 | 5.33 | 2.11 | 4.20 | 2.09 | 4.96 | 2.14 | 5.04 | 2.11 |
| friendly / unfriendly | 4.58 | 1.98 | 7.37 | 1.53 | 2.96 | 1.69 | 5.05 | 1.99 | 5.06 | 1.92 |
| happy / unhappy | 3.97 | 1.92 | 7.57 | 1.50 | 2.74 | 1.76 | 4.34 | 1.95 | 4.29 | 1.86 |
| normal / weird | 5.60 | 2.06 | 6.38 | 0.97 | 4.41 | 2.10 | 6.12 | 2.00 | 6.23 | 1.95 |

S8—FAR ranking consistency analysis



Fig. S4. A chart of the false alarm rates (FARs) for every identity across the different experimental image pairs, showing how FAR ranking is preserved across these transformations. The image categories here are only for the first image presented, due to the nature of FARs. Each neutral image is colored by ranking, with the highest FARs in blue and the lowest FARs in red. The FAR for each identity is then shown for all possible transformations, with circles of the same person retaining the same colors from the neutral version. As one can see, the blue dots generally stay at the top across transformations, while the red dots generally stay at the bottom across transformations. These results are confirmed statistically using Spearman’s rank correlations against the neutral rankings. Asterisks indicate significant correlations at the level of *p* < 0.05.

S9—*d´* ranking consistency analysis



Fig. S5. A chart of *d´* for every identity across the different experimental image pairs, showing how *d´* ranking is generally preserved across these transformations. Each neutral-neutral image pair is colored by ranking, with the highest in blue and the lowest in red. *d´* for each identity is then shown for all possible transformations, with circles of the same person retaining the same colors from the neutral version. As one can see, the blue dots generally stay at the top across transformations, while the red dots generally stay at the bottom across transformations. These results are confirmed statistically using Spearman’s rank correlations against the neutral-neutral rankings. Asterisks indicate significant correlations at the level of *p* < 0.05.

S10— Spearman’s rank correlations of HR between all image pairs

The correlation coefficient *r* and significance value *p* from Spearman’s rank correlations between the HRs of all identities for every image pair with every other image pair. This table shows only the lower triangle of the correlation matrix (as it is symmetrical along the diagonal). Cells colored in gray indicate significantly high correlations between the image pairs, based on a cutoff of *p* < 0.05. In the main manuscript, the across-image pair consistency analysis looks specifically at the correlation of the neutral-neutral pair with every other pair type.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Neutral-neutral |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Neutral-neutral | r | 1 | Happy-happy |  |  |  |  |  |  |  |  |  |  |  |
| p | 0 |  |  |  |  |  |  |  |  |  |  |  |
| Happy-happy | r | 0.63 | 1 | Angry-angry |  |  |  |  |  |  |  |  |  |  |
| p | 2.32E-05 | 0 |  |  |  |  |  |  |  |  |  |  |
| Angry-angry | r | 0.49 | 0.43 | 1 | 3/4-3/4 |  |  |  |  |  |  |  |  |  |
| p | 0.004 | 0.014 | 0 |  |  |  |  |  |  |  |  |  |
| 3/4-3/4 | r | 0.52 | 0.23 | 0.18 | 1 | Profile-profile |  |  |  |  |  |  |  |  |
| p | 0.002 | 0.213 | 0.317 | 0 |  |  |  |  |  |  |  |  |
| Profile-profile | r | 0.41 | 0.27 | 0.36 | 0.48 | 1 | Neutral-happy |  |  |  |  |  |  |  |
| p | 0.018 | 0.131 | 0.040 | 0.006 | 0 |  |  |  |  |  |  |  |
| Neutral-happy | r | 0.35 | 0.51 | 0.11 | 0.23 | 0.35 | 1 | Neutral-angry |  |  |  |  |  |  |
| p | 0.050 | 0.003 | 0.532 | 0.214 | 0.048 | 0 |  |  |  |  |  |  |
| Neutral-angry | r | 0.50 | 0.25 | 0.37 | 0.50 | 0.15 | 0.22 | 1 | Neutral-3/4 |  |  |  |  |  |
| p | 0.004 | 0.171 | 0.039 | 0.004 | 0.424 | 0.235 | 0 |  |  |  |  |  |
| Neutral-3/4 | r | 0.50 | 0.17 | 0.28 | 0.39 | 0.24 | 0.11 | 0.35 | 1 | Neutral-profile |  |  |  |  |
| p | 0.004 | 0.363 | 0.117 | 0.026 | 0.194 | 0.536 | 0.048 | 0 |  |  |  |  |
| Neutral-profile | r | 0.04 | 0.15 | 0.07 | 0.20 | 0.07 | 0.14 | 0.14 | 0.37 | 1 | Happy-neutral |  |  |  |
| p | 0.844 | 0.419 | 0.705 | 0.263 | 0.693 | 0.440 | 0.438 | 0.035 | 0 |  |  |  |
| Happy-neutral | r | 0.52 | 0.50 | 0.31 | 0.34 | 0.59 | 0.29 | 0.18 | 0.37 | 0.15 | 1 | Angry-neutral |  |  |
| p | 0.002 | 0.004 | 0.080 | 0.054 | 4.07E-04 | 0.109 | 0.330 | 0.035 | 0.399 | 0 |  |  |
| Angry-neutral | r | 0.46 | 0.43 | 0.38 | 0.42 | 0.59 | 0.35 | 0.14 | 0.41 | 0.21 | 0.67 | 1 | 3/4-neutral |  |
| p | 0.009 | 0.015 | 0.033 | 0.018 | 4.15E-04 | 0.051 | 0.439 | 0.018 | 0.256 | 2.32E-05 | 0 |  |
| 3/4-neutral | r | 0.47 | 0.47 | 0.49 | 0.36 | 0.36 | 0.27 | 0.31 | 0.46 | 0.15 | 0.57 | 0.53 | 1 | Profile-neutral |
| p | 0.007 | 0.007 | 0.004 | 0.040 | 0.043 | 0.137 | 0.082 | 0.008 | 0.416 | 0.001 | 0.002 | 0 |
| Profile-neutral | r | 0.33 | 0.38 | 0.43 | 0.23 | 0.30 | 0.21 | 0.40 | 0.40 | 0.08 | 0.36 | 0.32 | 0.71 | 1 |
| p | 0.063 | 0.032 | 0.014 | 0.201 | 0.096 | 0.256 | 0.024 | 0.022 | 0.675 | 0.040 | 0.071 | 6.57E-06 | 0 |

S11— Spearman’s rank correlations of FAR between all image pairs

The correlation coefficient *r* and significance value *p* from Spearman’s rank correlations between the FARs of all identities for every image type with every other image type. Note that false alarms are only dependent on the first image shown, and so this is grouped by first image type rather than image pair type. This table shows only the lower triangle of the correlation matrix (as it is symmetrical along the diagonal). Cells colored in gray indicate significantly high correlations between the image pairs, based on a cutoff of *p* < 0.05. In the main manuscript, the across-image consistency analysis looks specifically at the correlation of the neutral images with every other image type.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Neutral |  |  |  |  |
| Neutral | r | 1 |  |  |  |  |
| p | 0 | Happy |  |  |  |
| Happy | r | 0.70 | 1 |  |  |  |
| p | 1.29E-05 | 0 | Angry |  |  |
| Angry | r | 0.66 | 0.72 | 1 |  |  |
| p | 6.65E-05 | 6.18E-06 | 0 | 3/4 |  |
| 3/4 | r | 0.66 | 0.74 | 0.55 | 1 |  |
| p | 5.60E-05 | 3.74E-06 | 0.001 | 0 | Profile |
| Profile | r | 0.55 | 0.70 | 0.55 | 0.65 | 1 |
| p | 0.001 | 1.54E-05 | 0.001 | 7.68E-05 | 0 |

S12— Spearman’s rank correlations of *d´* between all image pairs

The correlation coefficient *r* and significance value *p* from Spearman’s rank correlations between the *d´*s of all identities for every image pair with every other image pair. This table shows only the lower triangle of the correlation matrix (as it is symmetrical along the diagonal), based on a cutoff of *p* < 0.05. Cells colored in gray indicate significantly high correlations between the image pairs. In the main manuscript, the across-image pair consistency analysis looks specifically at the correlation of the neutral-neutral pair with every other pair type.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Neutral-neutral |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Neutral-neutral | r | 1 | Happy-happy |  |  |  |  |  |  |  |  |  |  |  |
| p | 0 |  |  |  |  |  |  |  |  |  |  |  |
| Happy-happy | r | 0.37 | 1 | Angry-angry |  |  |  |  |  |  |  |  |  |  |
| p | 0.036 | 0 |  |  |  |  |  |  |  |  |  |  |
| Angry-angry | r | 0.52 | 0.49 | 1 | 3/4-3/4 |  |  |  |  |  |  |  |  |  |
| p | 0.002 | 0.004 | 0 |  |  |  |  |  |  |  |  |  |
| 3/4-3/4 | r | 0.46 | 0.47 | 0.34 | 1 | Profile-profile |  |  |  |  |  |  |  |  |
| p | 0.008 | 0.006 | 0.059 | 0 |  |  |  |  |  |  |  |  |
| Profile-profile | r | 0.36 | 0.61 | 0.44 | 0.51 | 1 | Neutral-happy |  |  |  |  |  |  |  |
| p | 0.042 | 2.08E-04 | 0.011 | 0.003 | 0 |  |  |  |  |  |  |  |
| Neutral-happy | r | 0.35 | 0.49 | 0.46 | 0.52 | 0.50 | 1 | Neutral-angry |  |  |  |  |  |  |
| p | 0.048 | 0.005 | 0.008 | 0.002 | 0.004 | 0 |  |  |  |  |  |  |
| Neutral-angry | r | 0.39 | 0.05 | 0.15 | 0.37 | -0.01 | 0.30 | 1 | Neutral-3/4 |  |  |  |  |  |
| p | 0.028 | 0.781 | 0.427 | 0.037 | 0.969 | 0.091 | 0 |  |  |  |  |  |
| Neutral-3/4 | r | 0.29 | -0.12 | 0.29 | 0.18 | 0.20 | 0.29 | 0.22 | 1 | Neutral-profile |  |  |  |  |
| p | 0.109 | 0.499 | 0.104 | 0.333 | 0.267 | 0.106 | 0.226 | 0 |  |  |  |  |
| Neutral-profile | r | 0.01 | 0.20 | 0.14 | 0.35 | 0.49 | 0.47 | 0.19 | 0.27 | 1 | Happy-neutral |  |  |  |
| p | 0.964 | 0.267 | 0.448 | 0.047 | 0.004 | 0.006 | 0.288 | 0.140 | 0 |  |  |  |
| Happy-neutral | r | 0.40 | 0.47 | 0.37 | 0.43 | 0.54 | 0.19 | -0.04 | 0.20 | 0.25 | 1 | Angry-neutral |  |  |
| p | 0.022 | 0.007 | 0.038 | 0.015 | 0.001 | 0.290 | 0.838 | 0.268 | 0.176 | 0 |  |  |
| Angry-neutral | r | 0.46 | 0.56 | 0.60 | 0.50 | 0.55 | 0.42 | -0.16 | 0.32 | 0.13 | 0.54 | 1 | 3/4-neutral |  |
| p | 0.008 | 0.001 | 2.53E-04 | 0.004 | 0.001 | 0.016 | 0.385 | 0.072 | 0.470 | 0.001 | 0 |  |
| 3/4-neutral | r | 0.36 | 0.44 | 0.40 | 0.28 | 0.57 | 0.41 | 0.00 | 0.00 | 0.14 | 0.56 | 0.48 | 1 | Profile-neutral |
| p | 0.041 | 0.012 | 0.024 | 0.128 | 0.001 | 0.020 | 0.985 | 0.987 | 0.454 | 0.001 | 0.006 | 0 |
| Profile-neutral | r | 0.19 | 0.24 | 0.19 | 0.29 | 0.46 | 0.07 | 0.06 | 0.12 | -0.01 | 0.45 | 0.38 | 0.55 | 1 |
| p | 0.304 | 0.178 | 0.289 | 0.109 | 0.009 | 0.697 | 0.743 | 0.496 | 0.969 | 0.010 | 0.034 | 0.001 | 0 |