## Table S1

| **Component** | **Term** | **Estimate** | **Std Error** | **t-value** | **p-value** |
| --- | --- | --- | --- | --- | --- |
| A. parametric coefficients | (Intercept) | -0.750 | 0.026 | -29.317 | \*\*\* |
| TypeEcology & Behavior | -1.708 | 0.052 | -32.790 | \*\*\* |
| TypeGeography | -1.245 | 0.087 | -14.252 | \*\*\* |
| TypePeople | -1.211 | 0.063 | -19.356 | \*\*\* |
| TypeModern & Past Culture | -3.602 | 0.143 | -25.256 | \*\*\* |
| TypeOther | -2.507 | 0.102 | -24.629 | \*\*\* |
| **Component** | **Term** | **edf** | **Ref. df** | **F-value** | **p-value** |
| B. smooth terms | s(Year) | 1.002 | 1.003 | 9.204 | \*\* |
| s(Year):TypeMorphology | 5.413 | 6.455 | 12.340 | \*\*\* |
| s(Year):TypeEcology & Behavior | 5.125 | 6.177 | 3.879 | \*\*\* |
| s(Year):TypeGeography | 8.199 | 8.695 | 15.401 | \*\*\* |
| s(Year):TypePeople | 5.630 | 6.608 | 13.869 | \*\*\* |
| s(Year):TypeModern & Past Culture | 3.421 | 4.234 | 20.254 | \*\*\* |
| s(Year):TypeOther | 5.663 | 6.667 | 8.849 | \*\*\* |
| Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1 | | | | | |
|  | | | | | |
| Adjusted R-squared: 0.942, Deviance explained 0.932 | | | | | |
| GCV : 1.959, Scale est: 2.050, N: 1386 | | | | | |

## Table S2

| **Component** | **Term** | **Estimate** | **Std Error** | **t-value** | **p-value** |
| --- | --- | --- | --- | --- | --- |
| A. parametric coefficients | (Intercept) | -0.942 | 0.030 | -31.376 | \*\*\* |
| ContinentAfrica | 0.175 | 0.043 | 4.027 | \*\*\* |
| ContinentAsia | 0.165 | 0.038 | 4.322 | \*\*\* |
| ContinentN\_America | 0.021 | 0.048 | 0.439 |  |
| ContinentOceania | 0.165 | 0.057 | 2.889 | \*\* |
| ContinentS\_America | 0.112 | 0.045 | 2.484 | \* |
| TypeEcology & Behavior | -1.227 | 0.057 | -21.483 | \*\*\* |
| TypeGeography | -0.993 | 0.069 | -14.425 | \*\*\* |
| TypePeople | -0.789 | 0.057 | -13.761 | \*\*\* |
| TypeModern & Past Culture | -3.026 | 0.130 | -23.199 | \*\*\* |
| TypeOther | -2.460 | 0.098 | -25.131 | \*\*\* |
| ContinentAfrica:TypeEcology & Behavior | -0.641 | 0.084 | -7.654 | \*\*\* |
| ContinentAsia:TypeEcology & Behavior | -0.549 | 0.076 | -7.231 | \*\*\* |
| ContinentN\_America:TypeEcology & Behavior | -0.042 | 0.097 | -0.431 |  |
| ContinentOceania:TypeEcology & Behavior | -0.558 | 0.116 | -4.804 | \*\*\* |
| ContinentS\_America:TypeEcology & Behavior | -0.678 | 0.080 | -8.437 | \*\*\* |
| ContinentAfrica:TypeGeography | -0.060 | 0.100 | -0.600 |  |
| ContinentAsia:TypeGeography | -0.167 | 0.098 | -1.706 | . |
| ContinentN\_America:TypeGeography | -0.133 | 0.154 | -0.864 |  |
| ContinentOceania:TypeGeography | -1.829 | 1.812 | -1.009 |  |
| ContinentS\_America:TypeGeography | -0.167 | 0.122 | -1.369 |  |
| ContinentAfrica:TypePeople | -0.094 | 0.088 | -1.070 |  |
| ContinentAsia:TypePeople | -0.293 | 0.074 | -3.937 | \*\*\* |
| ContinentN\_America:TypePeople | -0.446 | 0.091 | -4.914 | \*\*\* |
| ContinentOceania:TypePeople | -0.421 | 0.145 | -2.909 | \*\* |
| ContinentS\_America:TypePeople | -2.662 | 0.916 | -2.906 | \*\* |
| ContinentAfrica:TypeModern & Past Culture | -0.875 | 0.222 | -3.941 | \*\*\* |
| ContinentAsia:TypeModern & Past Culture | -1.050 | 0.229 | -4.580 | \*\*\* |
| ContinentN\_America:TypeModern & Past Culture | -0.491 | 0.227 | -2.165 | \* |
| ContinentOceania:TypeModern & Past Culture | -1.807 | 1.700 | -1.063 |  |
| ContinentS\_America:TypeModern & Past Culture | -0.828 | 0.343 | -2.412 | \* |
| ContinentAfrica:TypeOther | -0.108 | 0.153 | -0.706 |  |
| ContinentAsia:TypeOther | -0.332 | 0.130 | -2.558 | \* |
| ContinentN\_America:TypeOther | 0.324 | 0.171 | 1.900 | . |
| ContinentOceania:TypeOther | -0.863 | 0.802 | -1.076 |  |
| ContinentS\_America:TypeOther | -0.224 | 0.880 | -0.255 |  |
| **Component** | **Term** | **edf** | **Ref. df** | **F-value** | **p-value** |
| B. smooth terms | s(Year):interaction(Continent, Type)Europe.Morphology | 2.830 | 3.530 | 242.303 | \*\*\* |
| s(Year):interaction(Continent, Type)Africa.Morphology | 6.608 | 7.583 | 218.305 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.Morphology | 7.815 | 8.569 | 502.507 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.Morphology | 3.761 | 4.640 | 194.735 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.Morphology | 8.204 | 8.729 | 609.158 | \*\*\* |
| s(Year):interaction(Continent, Type)S\_America.Morphology | 8.242 | 8.746 | 1,334.525 | \*\*\* |
| s(Year):interaction(Continent, Type)Europe.Ecology & Behavior | 1.925 | 2.403 | 77.591 | \*\*\* |
| s(Year):interaction(Continent, Type)Africa.Ecology & Behavior | 1.633 | 2.043 | 23.354 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.Ecology & Behavior | 5.973 | 7.076 | 253.558 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.Ecology & Behavior | 7.522 | 8.384 | 62.591 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.Ecology & Behavior | 6.298 | 7.291 | 65.943 | \*\*\* |
| s(Year):interaction(Continent, Type)S\_America.Ecology & Behavior | 1.000 | 1.000 | 107.446 | \*\*\* |
| s(Year):interaction(Continent, Type)Europe.Geography | 5.612 | 6.646 | 231.623 | \*\*\* |
| s(Year):interaction(Continent, Type)Africa.Geography | 8.040 | 8.602 | 193.828 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.Geography | 8.704 | 8.957 | 579.063 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.Geography | 4.629 | 5.575 | 106.487 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.Geography | 7.705 | 7.934 | 348.725 | \*\*\* |
| s(Year):interaction(Continent, Type)S\_America.Geography | 8.827 | 8.980 | 776.450 | \*\*\* |
| s(Year):interaction(Continent, Type)Europe.People | 7.062 | 8.008 | 161.586 | \*\*\* |
| s(Year):interaction(Continent, Type)Africa.People | 7.801 | 8.448 | 96.385 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.People | 6.376 | 7.352 | 169.379 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.People | 1.000 | 1.000 | 121.112 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.People | 5.336 | 6.272 | 239.574 | \*\*\* |
| s(Year):interaction(Continent, Type)S\_America.People | 8.873 | 8.984 | 227.640 | \*\*\* |
| s(Year):interaction(Continent, Type)Europe.Modern & Past Culture | 2.408 | 3.023 | 51.359 | \*\*\* |
| s(Year):interaction(Continent, Type)Africa.Modern & Past Culture | 5.931 | 6.974 | 154.910 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.Modern & Past Culture | 8.125 | 8.748 | 58.162 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.Modern & Past Culture | 1.001 | 1.001 | 91.416 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.Modern & Past Culture | 6.287 | 6.750 | 78.714 | \*\*\* |
| s(Year):interaction(Continent, Type)S\_America.Modern & Past Culture | 3.584 | 4.343 | 427.172 | \*\*\* |
| s(Year):interaction(Continent, Type)Europe.Other | 4.243 | 5.207 | 7.684 |  |
| s(Year):interaction(Continent, Type)Africa.Other | 6.856 | 7.736 | 44.220 | \*\*\* |
| s(Year):interaction(Continent, Type)Asia.Other | 6.130 | 7.180 | 30.259 | \*\*\* |
| s(Year):interaction(Continent, Type)N\_America.Other | 7.550 | 8.276 | 33.406 | \*\*\* |
| s(Year):interaction(Continent, Type)Oceania.Other | 6.504 | 7.012 | 22.008 | \*\* |
| s(Year):interaction(Continent, Type)S\_America.Other | 8.727 | 8.930 | 196.719 | \*\*\* |
| Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1 | | | | | |
|  | | | | | |
| Adjusted R-squared: 0.838, Deviance explained 0.817 | | | | | |
| UBRE : 0.303, Scale est: 1.000, N: 7374 | | | | | |

## Table S3

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -0.933 | 0.035 | -26.750 | 0.0000 | \*\*\* |
| ContinentAfrica | 0.352 | 0.039 | 8.991 | 0.0000 | \*\*\* |
| ContinentAsia | 0.219 | 0.038 | 5.793 | 0.0000 | \*\*\* |
| ContinentN\_America | 0.190 | 0.046 | 4.084 | 0.0000 | \*\*\* |
| ContinentS\_America | 0.168 | 0.038 | 4.408 | 0.0000 | \*\*\* |
| ContinentOceania | 0.201 | 0.040 | 5.033 | 0.0000 | \*\*\* |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 5.937e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 5.926e+04 on 44535 degrees of freedom | | | | | |

## Table S4

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -2.275 | 0.063 | -35.954 | 0.0000 | \*\*\* |
| ContinentAfrica | -0.504 | 0.079 | -6.393 | 0.0000 | \*\*\* |
| ContinentAsia | -0.818 | 0.076 | -10.769 | 0.0000 | \*\*\* |
| ContinentN\_America | 0.076 | 0.086 | 0.890 | 0.3732 |  |
| ContinentS\_America | -0.748 | 0.076 | -9.843 | 0.0000 | \*\*\* |
| ContinentOceania | -0.443 | 0.079 | -5.613 | 0.0000 | \*\*\* |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 1.97e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 1.947e+04 on 44535 degrees of freedom | | | | | |

## Table S5

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -1.129 | 0.038 | -29.890 | 0.0000 | \*\*\* |
| ContinentAfrica | -0.177 | 0.045 | -3.963 | 0.0001 | \*\*\* |
| ContinentAsia | 0.260 | 0.041 | 6.384 | 0.0000 | \*\*\* |
| ContinentN\_America | -0.035 | 0.052 | -0.678 | 0.4977 |  |
| ContinentS\_America | 0.197 | 0.041 | 4.788 | 0.0000 | \*\*\* |
| ContinentOceania | 0.017 | 0.044 | 0.397 | 0.6911 |  |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 5.456e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 5.424e+04 on 44535 degrees of freedom | | | | | |

## Table S6

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -1.199 | 0.039 | -30.829 | 0.0000 | \*\*\* |
| ContinentAfrica | -0.117 | 0.046 | -2.567 | 0.0103 | \* |
| ContinentAsia | -0.272 | 0.044 | -6.249 | 0.0000 | \*\*\* |
| ContinentN\_America | -0.375 | 0.058 | -6.459 | 0.0000 | \*\*\* |
| ContinentS\_America | -0.397 | 0.044 | -8.936 | 0.0000 | \*\*\* |
| ContinentOceania | -0.087 | 0.046 | -1.891 | 0.0586 | . |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 4.604e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 4.587e+04 on 44535 degrees of freedom | | | | | |

## Table S7

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -3.243 | 0.101 | -32.102 | 0.0000 | \*\*\* |
| ContinentAfrica | -0.543 | 0.127 | -4.275 | 0.0000 | \*\*\* |
| ContinentAsia | -0.744 | 0.120 | -6.180 | 0.0000 | \*\*\* |
| ContinentN\_America | 0.062 | 0.137 | 0.450 | 0.6525 |  |
| ContinentS\_America | 0.317 | 0.109 | 2.916 | 0.0035 | \*\* |
| ContinentOceania | -0.300 | 0.123 | -2.434 | 0.0149 | \* |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 1.27e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 1.244e+04 on 44535 degrees of freedom | | | | | |

## Table S8

|  | Estimate | Standard Error | z value | Pr(>|z|) | Signif. |
| --- | --- | --- | --- | --- | --- |
| (Intercept) | -3.275 | 0.103 | -31.915 | 0.0000 | \*\*\* |
| ContinentAfrica | 0.165 | 0.117 | 1.418 | 0.1563 |  |
| ContinentAsia | -0.340 | 0.116 | -2.928 | 0.0034 | \*\* |
| ContinentN\_America | 0.458 | 0.129 | 3.566 | 0.0004 | \*\*\* |
| ContinentS\_America | 0.595 | 0.109 | 5.474 | 0.0000 | \*\*\* |
| ContinentOceania | 0.078 | 0.119 | 0.653 | 0.5135 |  |
| *Signif. codes: 0 <= '\*\*\*' < 0.001 < '\*\*' < 0.01 < '\*' < 0.05 < '.' < 0.1 < '' < 1* | | | | | |
|  | | | | | |
| (Dispersion parameter for binomial family taken to be 1) | | | | | |
| Null deviance: 1.629e+04 on 44540 degrees of freedom | | | | | |
| Residual deviance: 1.605e+04 on 44535 degrees of freedom | | | | | |