**Supplementary Materials**

Health news sharing is reflected in distributed reward-related brain activity

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**Fitting models that use ventral striatum and vmPFC as separate predictor variables.** Extending analyses reported in Scholz et al. (2018), we fit additional models that used ventral striatum and vmPFC as separate predictor variables of population level news sharing. The two variables (ventral striatum and vmPFC) were highly correlated at both the trial-to-trial level, $r = .73$, and the article-to-article level, $r = .83$. In separate bivariate multilevel models, we saw relationships with article sharing at the within-person level for both ventral striatum, $\beta = .08$, 95%CI[.06, .11] and vmPFC, $\beta = .09$, 95%CI[.06, .12], as well as at the article-to-article level for both ventral striatum, $\beta = .38$, 95%CI[.18, .59] and vmPFC, $\beta = .37$, 95%CI[.16, .57]. Thus, these coefficients are highly similar. Future work that tests the conditions under which different parts of the reward value system provide similar or distinct information will be informative.

**Additional model $R^2$ metrics for models linking pattern expression and population level sharing.** We conducted a series of additional model comparisons to better understand the relative value of the different kinds of predictor variables (self reports, brain regions of interest, brain patterns of interest). First, we estimated $R^2$ for the value-related ROI alone for both within-person models, $R^2 = .009$ and the between-article models, $R^2 = .13$. Second, we estimated $R^2$ for the value-related pattern alone for both within-person models, $R^2 = .01$, and the between-article models, $R^2 = .16$. Third, we estimated $R^2$ for the value-related pattern together with ratings for both within-person models, $R^2$ = .02, and the between-article models, $R^2$ = .23.

**Comparison of bivariate models with only value-related ROI versus only value-related pattern.** In a follow-up analysis, we fit and compared two models with only a single predictor variable – the value-related ROI, and the value-related pattern. In these bivariate models, the value-related ROI was related to population sharing, β = .12, 95%CI[.05, .19], $R^2$=.01. The value-related pattern was also related to population sharing, β = .14, 95%CI[.05, .22], $R^2$=.02. A comparison of these models indicated that the model using the reward-related pattern was higher in expected out-of-sample predictive accuracy, ∆LOOIC = -1.9, SE = 4.5.

**Fitting models with comparison patterns indexing memory- and vision-related brain processes.** In another follow-up analysis, we fit models that used expression of brain patterns related to processes other than reward in order to ask if these also showed relationships with population article sharing. Specifically, we used meta-analytic maps from Neurosynth for the terms 'memory' and 'vision'. Results from these models indicated that neither expression of the memory-related pattern, β = -.04, 95%CI[-.11, .04], $R^2$=.002, or the vision-related pattern, β = .00, 95%CI[-.04, .05], $R^2$=.00, was clearly related to population-level article sharing.

**Comparing self-reports of reading intentions and self-reports of sharing intentions.** In our analyses of study 1, we use participants' self-reports of reading intentions as a self-report rating variable, and in study 2 we use participants' self-reports of sharing intentions. In these data, we see that both kinds of self-reports show similar relationships with population-level article sharing. For example, at the article-to-article level, we see similar magnitude relationships with population article sharing for both reading intentions in study 1, $r = .39$, and sharing intentions in study 2, $r = .34$. Further, since we used the same articles in study 1 and study 2, it is possible to also show that at the article-to-article level, these two self-reports are correlated -- articles that tend to receive high reading intentions also tend to receive high sharing intentions, $r = .42$. Therefore, despite the fact that these two types of intentions likely reflect some shared and some distinct psychological characteristics, in an effort to make use of all of our data, in models that combine study 1 and study 2, we use both as indices of self-reported article value.

**Table S1.** *One predictor multilevel model in study 1. Using pattern of interest (POI) as a predictor of population sharing.*

Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(POI) + (scale(POI) | subj)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
total post-warmup samples = 2000

Group-Level Effects:
~subj (Number of levels: 39)

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sd(Intercept) | 0.07 | 0.05 | 0.00 | 0.18 | 1.00 | 794 | 1129 |
| sd(scalePOI) | 0.10 | 0.06 | 0.00 | 0.24 | 1.01 | 589 | 704 |
| cor(Intercept,scalePOI) | 0.04 | 0.55 | -0.94 | 0.94 | 1.01 | 587 | 967 |

Population-Level Effects:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| Intercept | 0.01 | 0.04 | -0.08 | 0.09 | 1.00 | 2131 | 1275 |
| scalePOI | 0.10 | 0.04 | 0.03 | 0.18 | 1.00 | 1858 | 1405 |

Family Specific Parameters:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sigma | 0.99 | 0.03 | 0.94 | 1.04 | 1.00 | 3416 | 1592 |

*Notes.* Estimate = mean of the posterior distribution; Est. Error = standard deviation of the posterior distribution; l-95%CI and u-95%CI = lower and upper bound of the 95% credibility interval; Rhat = Gelman-Rubin convergence diagnostic; Bulk_ESS = effective sample size obtained by the MCMC algorithm; Tail ESS = minimum of the effective MCMC sample size at the 5% and 95% quantiles;

**Table S2.** *One predictor multilevel model in study 2. Using pattern of interest (POI) as a predictor of population sharing.*

Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(POI) + (scale(POI) | subj)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
total post-warmup samples = 2000

Group-Level Effects:
~subj (Number of levels: 38)

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sd(Intercept) | 0.06 | 0.04 | 0.00 | 0.15 | 1.00 | 570 | 1104 |
| sd(scalePOI) | 0.11 | 0.05 | 0.02 | 0.20 | 1.01 | 524 | 699 |
| cor(Intercept,scalePOI) | 0.22 | 0.52 | -0.87 | 0.96 | 1.01 | 321 | 409 |

Population-Level Effects:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| Intercept | 0.00 | 0.03 | -0.06 | 0.06 | 1.00 | 1936 | 1534 |
| scalePOI | 0.15 | 0.04 | 0.06 | 0.24 | 1.00 | 1593 | 1128 |

Family Specific Parameters:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sigma | 0.99 | 0.02 | 0.95 | 1.02 | 1.00 | 2554 | 1182 |

**Table S3.** *One predictor article-level model in study 1. Using pattern of interest (POI) as a predictor of population sharing.*

```
Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(POI)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
         total post-warmup samples = 2000

Population-Level Effects:
          Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept    -0.00      0.10    -0.21     0.19 1.00     1922     1538
scalePOI      0.33      0.10     0.12     0.54 1.00     1753     1229

Family Specific Parameters:
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sigma     0.93      0.08     0.79     1.10 1.00     1838     1447
```

**Table S4.** *One predictor article-level model in study 2. Using pattern of interest (POI) as a predictor of population sharing.*

```
Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(POI)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
         total post-warmup samples = 2000

Population-Level Effects:
          Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept     0.00      0.11    -0.21     0.21 1.00     1929     1398
scalePOI      0.41      0.10     0.21     0.62 1.00     1867     1205

Family Specific Parameters:
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sigma     0.96      0.08     0.82     1.13 1.00     1813     1470
```

**Table S5.** *Three predictor multilevel model in study 1. Using pattern of interest (POI), region of interest (ROI) and rating as predictors of population sharing.*

Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(rating) + scale(ROI) + scale(POI) + (scale(rating) + scale(ROI) + scale(POI) | subj)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
total post-warmup samples = 2000

Group-Level Effects:
~subj (Number of levels: 39)

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sd(Intercept) | 0.06 | 0.04 | 0.00 | 0.14 | 1.00 | 805 | 1031 |
| sd(scalerating) | 0.03 | 0.02 | 0.00 | 0.08 | 1.00 | 1119 | 976 |
| sd(scaleROI) | 0.03 | 0.02 | 0.00 | 0.09 | 1.00 | 1047 | 780 |
| sd(scalePOI) | 0.10 | 0.05 | 0.01 | 0.20 | 1.00 | 638 | 781 |
| cor(Intercept,scalerating) | -0.07 | 0.44 | -0.83 | 0.79 | 1.00 | 2405 | 1319 |
| cor(Intercept,scaleROI) | 0.04 | 0.46 | -0.81 | 0.84 | 1.00 | 1838 | 1394 |
| cor(scalerating,scaleROI) | 0.00 | 0.45 | -0.79 | 0.82 | 1.00 | 1519 | 1474 |
| cor(Intercept,scalePOI) | 0.13 | 0.42 | -0.70 | 0.85 | 1.00 | 759 | 1252 |
| cor(scalerating,scalePOI) | -0.11 | 0.45 | -0.87 | 0.80 | 1.01 | 711 | 1136 |
| cor(scaleROI,scalePOI) | 0.02 | 0.44 | -0.78 | 0.82 | 1.00 | 1122 | 1644 |

Population-Level Effects:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| Intercept | 0.00 | 0.03 | -0.05 | 0.06 | 1.00 | 2684 | 1549 |
| scalerating | 0.18 | 0.03 | 0.13 | 0.23 | 1.00 | 3011 | 1543 |
| scaleROI | 0.07 | 0.03 | 0.02 | 0.13 | 1.00 | 2529 | 1503 |
| scalePOI | 0.08 | 0.03 | 0.01 | 0.14 | 1.00 | 1787 | 1272 |

Family Specific Parameters:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sigma | 0.97 | 0.02 | 0.94 | 1.01 | 1.01 | 2865 | 1552 |

**Table S6.** *Three predictor multilevel model in study 2. Using pattern of interest (POI), region of interest (ROI) and rating as predictors of population sharing.*

Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(rating) + scale(ROI) + scale(POI) + (scale(rating) + scale(ROI) + scale(POI) | subj)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
total post-warmup samples = 2000

Group-Level Effects:
~subj (Number of levels: 38)

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sd(Intercept) | 0.09 | 0.06 | 0.01 | 0.21 | 1.01 | 852 | 805 |
| sd(scalerating) | 0.07 | 0.05 | 0.00 | 0.18 | 1.01 | 744 | 946 |
| sd(scaleROI) | 0.06 | 0.05 | 0.00 | 0.16 | 1.00 | 1015 | 1107 |
| sd(scalePOI) | 0.09 | 0.06 | 0.00 | 0.23 | 1.00 | 684 | 1057 |
| cor(Intercept,scalerating) | -0.05 | 0.45 | -0.83 | 0.77 | 1.00 | 2732 | 1415 |
| cor(Intercept,scaleROI) | 0.05 | 0.44 | -0.76 | 0.82 | 1.00 | 2696 | 1675 |
| cor(scalerating,scaleROI) | -0.07 | 0.46 | -0.84 | 0.79 | 1.00 | 2032 | 1400 |
| cor(Intercept,scalePOI) | 0.10 | 0.45 | -0.77 | 0.84 | 1.00 | 1657 | 1551 |
| cor(scalerating,scalePOI) | -0.00 | 0.44 | -0.79 | 0.80 | 1.00 | 1724 | 1548 |
| cor(scaleROI,scalePOI) | 0.02 | 0.45 | -0.79 | 0.82 | 1.00 | 1741 | 1894 |

Population-Level Effects:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| Intercept | 0.00 | 0.04 | -0.08 | 0.08 | 1.00 | 2581 | 1740 |
| scalerating | 0.19 | 0.04 | 0.11 | 0.27 | 1.00 | 3006 | 1473 |
| scaleROI | 0.09 | 0.04 | 0.02 | 0.17 | 1.00 | 3503 | 1512 |
| scalePOI | 0.12 | 0.04 | 0.03 | 0.20 | 1.00 | 2977 | 1486 |

Family Specific Parameters:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sigma | 0.96 | 0.03 | 0.92 | 1.02 | 1.00 | 2838 | 1226 |

**Table S7.** *Three predictor article-level model in study 1. Using pattern of interest (POI), region of interest (ROI) and rating as predictors of population sharing.*

Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(rating) + scale(ROI) + scale(POI)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
total post-warmup samples = 2000

Population-Level Effects:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| Intercept | 0.00 | 0.10 | -0.19 | 0.19 | 1.00 | 2399 | 1430 |
| scalerating | 0.30 | 0.10 | 0.10 | 0.51 | 1.00 | 2322 | 1538 |
| scaleROI | 0.14 | 0.10 | -0.06 | 0.34 | 1.00 | 2144 | 1375 |
| scalePOI | 0.32 | 0.10 | 0.12 | 0.52 | 1.00 | 2237 | 1582 |

Family Specific Parameters:

| | Estimate | Est.Error | l-95% CI | u-95% CI | Rhat | Bulk_ESS | Tail_ESS |
|---|---|---|---|---|---|---|---|
| sigma | 0.86 | 0.07 | 0.72 | 1.02 | 1.00 | 2223 | 1308 |

**Table S8.** *Three predictor article-level model in study 2. Using pattern of interest (POI), region of interest (ROI) and rating as predictors of population sharing.*

```
Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(population_sharing) ~ scale(rating) + scale(ROI) + scale(POI)
Samples: 4 chains, each with iter = 1000; warmup = 500; thin = 1;
         total post-warmup samples = 2000

Population-Level Effects:
            Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept       0.00      0.10    -0.21     0.21 1.00     2225     1591
scalerating     0.10      0.12    -0.12     0.32 1.00     2088     1542
scaleROI        0.22      0.12    -0.02     0.45 1.00     1608     1557
scalePOI        0.26      0.12     0.03     0.49 1.00     1610     1211

Family Specific Parameters:
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sigma     0.95      0.08     0.82     1.12 1.00     2040     1284
```

**Table S9.** *Cluster table of Neurosynth 'reward' association test map, thresholded at* z > 2.56, k=50.

Cluster Table of map: "Neurosynth - Reward, Association Test"

| x | y | z | k | max z | mean z | Talaraich label |
|---|---|---|---|---|---|---|
| 13 | 6 | -2 | 4782 | 28.1 | 5.1 | RH Lentiform Nucleus (Lateral Globus Pallidus) |
| 3 | -26 | 30 | 72 | 5.3 | 3.6 | RH Cingulate Gyrus (Brodmann area 23) |
| -50 | 13 | 26 | 457 | -4.6 | -3.1 | LH Inferior Frontal Gyrus (Brodmann area 9) |
| -50 | -46 | 9 | 273 | -4.2 | -3.0 | LH Superior Temporal Gyrus (Brodmann area 22) |
| 24 | -67 | 46 | 150 | -4.1 | -3.0 | RH Superior Parietal Lobule (Brodmann area 7) |
| 48 | -66 | 9 | 102 | -4.1 | -3.0 | RH Middle Temporal Gyrus (Brodmann area 37) |
| -45 | -63 | -1 | 194 | -4.1 | -3.0 | LH Middle Temporal Gyrus (Brodmann area 37) |
| -24 | -59 | 53 | 214 | -4.1 | -3.0 | LH Precuneus (Brodmann area 7) |
| 61 | -27 | 20 | 72 | -4.0 | -3.0 | RH Postcentral Gyrus (Brodmann area 40) |
| -8 | 8 | 52 | 72 | -3.8 | -3.0 | LH Medial Frontal Gyrus (Brodmann area 6) |
| 62 | 17 | 14 | 52 | -3.6 | -3.0 | RH Inferior Frontal Gyrus (Brodmann area 44) |

**Table S9.** *Surface rendering of Neurosynth 'reward' association test map, thresholded at* z > 2.56, k=50.