Supporting Information

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SI Materials and Methods

Experimental Setting. Before scanning, participants were given written instructions to the task, which were repeated step by step orally. Subsequently, they were escorted inside the MRI or magnetoencephalography (MEG) scanning room and invited to find a comfortable body position that they could keep throughout the experiment. The only change was passing the power grip from one hand to the other between sessions. We used homemade power grips composed of two plastic cylinders compressing an air tube when squeezed. The tube led to the control room, where it was connected to a transducer converting air pressure into voltage. Thus, grip compression resulted in the generation of a differential voltage signal, linearly proportional to the force exerted. The signal was fed to the stimuli presentation PC via a signal conditioner (CED 1401; Cambridge Electronic Design) and read by a MATLAB program (MathWorks). Stimuli presentation was also programmed with MATLAB using Cogent 2000 (Wellcome Department of Imaging Neuroscience, London, UK).

fMRI Data Acquisition. Subject's head was constrained using foam and sand packs to limit movements. Functional echo-planar images (EPIs) were acquired with a T2*-weighted contrast on a 3-T scanner (Siemens Trio). Interleaved 2-mm slices separated by a 1.5-mm gap and oriented along a 30° tilted plane were acquired to cover the whole brain with a repetition time of 2 s. The first five scans were discarded to allow for equilibration effects. All preprocessing steps were performed using SPM8. Structural T1-weighted images were also acquired, coregistered with the mean EPI, segmented, and normalized to SPM standard Montreal Neurological Institute (MNI) T1 template. Normalized T1-images were averaged between subjects to localize group-level functional activations. EPIs were spatially realigned and normalized (using the same transformation as for structural images), and spatially smoothed with a 8-mm full-width at half-maximum Gaussian kernel.

MEG Data Acquisition. A whole-head MEG system comprising 151 axial gradiometers (CTF Systems) was used to sample brain activity at 1,250 Hz with online low-pass filter of 300 Hz. Head position was determined using marker coils at fiducial points (nasion, left and right ears). Ocular artifacts were marked manually and removed using the Gratton method with DataHandler (Cogimage, Centre de Recherche de l'Institut du Cerveau et de la Moelle Épinière, Paris, France). Data were imported in MATLAB and displayed using FieldTrip (Donders Institute, Nijmegen University, Nijmegen, The Netherlands). MEG signal was low-pass filtered offline at 30 Hz. Effort onsets and offsets were detected manually based on the electromyogram. A template mesh (8,196 tessels) and individual fiducials were used in SPM8 to compute a single shell head model and a lead field matrix per subject and session.

Incentive

A	S_E	S_R
1	1	1
1	1	0
1	0	1
1	0	0
0	1	1
0	1	0
0	0	1
0	0	0

X

Difficulty

A	S_E	S_R
1	1	1
1	1	0
1	0	1
1	0	0
0	1	1
0	1	0
0	0	1
0	0	0

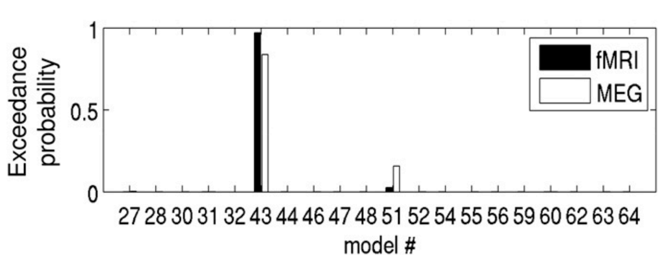

Fig. S1. Model comparison performed on behavioral data. The table illustrates all possible models obtained by varying the modulation of amplitude and slopes (*A*, S_e, and S_r) by monetary incentive (left columns) and/or task difficulty (right columns). Allowed (versus excluded) modulations are noted 1 (versus 0). "Allowed" means that there is a term for this modulation in the model. The red models are the combinations discarded a priori because they cannot reproduce the behavioral results. For instance, a model in which neither A or Se has an incentive term cannot reproduce Te modulation by incentives and therefore must be discarded. The surrounded combination corresponds to the model with the highest exceedance probability, calculated using Bayesian selection separately for fMRI and MEG subjects.

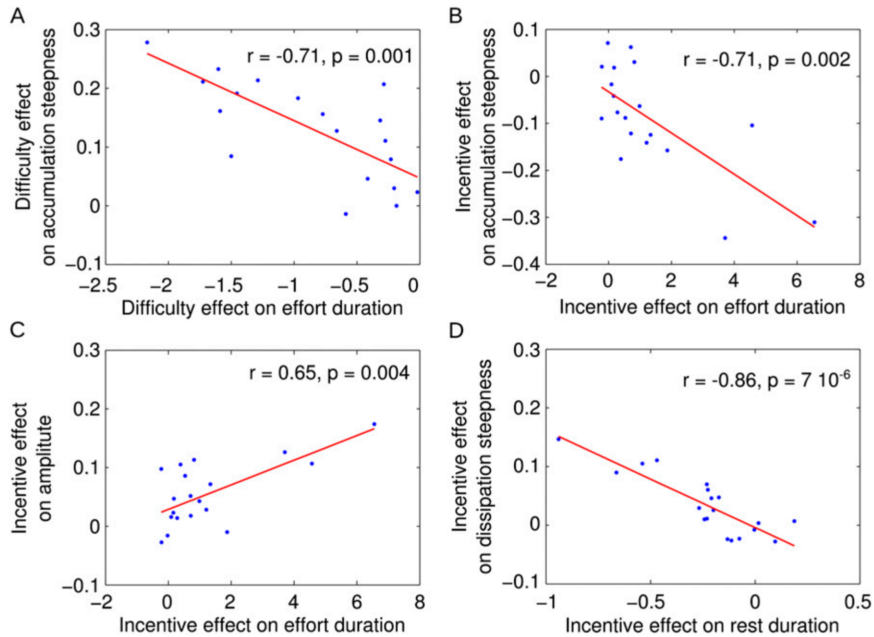

Fig. S2. Across-subject correlations between behavioral and computational effects of experimental factors (monetary incentive and task difficulty). Behavioral effects are as follows: shortened effort duration with higher task difficulty, prolonged effort duration with higher monetary incentive, and shortened rest duration with higher monetary incentive. Correlations were searched with all four computational effects that were found to explain these behavioral effects in MEG recordings. Computational effect refers to modulation of one parameter (accumulation steepness, dissipation steepness, or amplitude between bounds) of the signal reconstructed in our region of interest. Note that we use the term "steepness" and not "slope" because this power signal has no sign. The four computational effects are steeper accumulation with higher difficulty (*A*), slower accumulation with higher incentives (*B*), larger amplitude with higher incentives (*C*), and steeper dissipation with higher incentives (*D*). *R* values are Pearson ρ correlation coefficients; *P* values indicate the significance of robust-fit regressions (which underweight potential outliers).

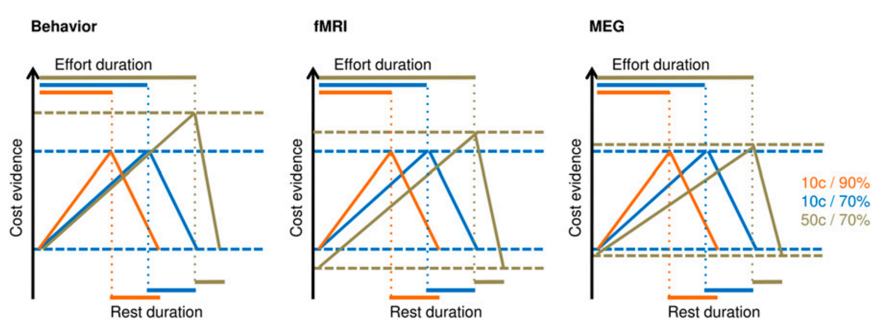

Fig. S3. Model refinement with fMRI and MEG findings. The diagrams illustrate how the experimental factors (monetary incentive and task difficulty) affect the accumulation of cost evidence. Compared with the blue line, the brown line shows the effect of increasing the incentive and the orange line the effect of increasing the difficulty. In the model that best explained the behavior (*Left*), the amplitude and dissipation slope are only impacted by incentives, whereas the accumulation slope is only impacted by difficulty. The fMRI results (*Center*) revealed that both the lower and upper bounds of the cost evidence signal encoded in brain activity are modulated by incentives. The MEG results (*Right*) revealed that the accumulation slope of this neural cost evidence is additionally impacted by incentives. Note that the three models produce the same pattern of effort and rest durations across conditions. In the final rightmost model, increasing the incentive (*i*) augments effort duration by inflating the amplitude and lowering the accumulation slope and (*ii*) reduces rest duration by accentuating the dissipation slope. In contrast, increasing the difficulty only shortens effort duration by enhancing the accumulation slope, without affecting the amplitude or dissipation slope.

Table S1. Brain regions parametrically modulated by the cost evidence signal in fMRI data analysis

Anatomical label	Peak t	Peak uncorrected P	Peak FWE P	Cluster FWE P	No. of voxels	Peak coordinates
Left posterior insula	5.825	0.000	0.011	0.006	226	[−40 −22 16]
Ventromedial thalamus	5.693	0.000	0.013	0.018	69	[2 −10 −4]
Right posterior insula	5.469	0.000	0.018	0.006	254	[42 −16 10]
Hypothalamus	4.819	0.000	0.053	0.031	36	[0 0 −20]
Fusiform gyrus	4.774	0.000	0.057	0.018	68	[22 −52 −10]
Cerebellum	4.422	0.000	0.100	0.041	24	[4 −46 −40]
Fusiform gyrus	4.234	0.001	0.132	0.038	27	[18 −70 −6]
Fusiform gyrus	4.227	0.001	0.133	0.035	30	[−10 −68 −4]

All clusters are listed that were observed using a voxel-wise threshold of $P < 0.001$, uncorrected, and a cluster-wise threshold of $P < 0.05$, family-wise error (FWE) corrected. The [*x y z*] peak coordinates in millimeters refer to the Montreal Neurological Institute (MNI) space.

Table S2. Brain regions parametrically modulated by the cost evidence signal when including the motor output (force) as a covariate in the GLM

Anatomical label	Peak t	Peak uncorrected P	Peak FWE P	Cluster FWE P	No. of voxels	Peak coordinates
Ventromedial thalamus	5.490	0.000	0.017	0.022	88	[2 −10 −4]
Right posterior insula	5.463	0.000	0.018	0.007	367	[42 −16 8]
Left posterior insula	5.410	0.000	0.019	0.008	286	[−42 −22 18]
Fusiform gyrus	4.661	0.000	0.064	0.005	616	[22 −52 −10]
Hypothalamus	4.578	0.000	0.073	0.033	59	[0 0 −20]
Cerebellum	4.540	0.000	0.078	0.032	61	[4 −48 −40]

All clusters are listed that were observed using a voxel-wise threshold of $P < 0.001$, uncorrected, and a cluster-wise threshold of $P < 0.05$, family-wise error (FWE) corrected. The [*x y z*] peak coordinates in millimeters refer to the Montreal Neurological Institute (MNI) space. The contrast tested is the cost evidence signal.