Supplementary Material - Dissociating the effect of noise on sensory processing and overall decision difficulty

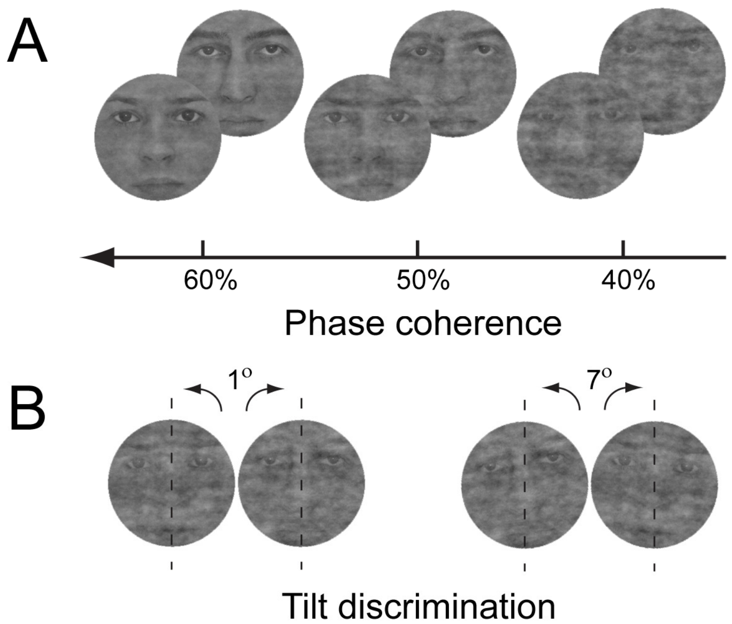

Figure S1. Stimuli of the control experiment. (A) Exemplar faces used in the gender categorization task; (B) exemplar faces used in the tilt discrimination task.

Supplementary Results

Table S1. *p* values of Tukey HSD post-hoc tests from the one-way ANOVAs conducted in analyzing behavioral data in the main experiment.

	C vs. M	C vs. N	M vs. N
EEG – accuracy	p = 0.0001	p = 0.0001	p = 0.986
EEG – RT	p = 0.0001	p = 0.0001	p = 0.362
fMRI – accuracy	p = 0.0001	p = 0.0001	p = 0.245
fMRI – RT	p = 0.0001	p = 0.0001	p = 0.164

Behavioral Results of the control experiment

Gender categorization was increasingly more difficult as the phase coherence of the faces decreased: subjects' categorization accuracy significantly decreased (FigS2A; main effect of noise: $F_{(2,26)}=94.30$, $p<0.0001$, with post hoc p values of $p=0.009$ and $p=0.0001$ between increasing noise steps) along with a significant increase in reaction times ($F_{(2,26)}=37.86$, $p<0.0001$, with post hoc p values of $p=0.004$ and $p=0.0001$). Similarly, in the tilt discrimination task subjects' accuracy showed a drastic drop in the 1 deg compared with the 7 deg tilt condition (FigS2B; $t_{(14)}=16.89$, $p<0.0001$) and a concomitant increase in RT ($t_{(14)}=-11.19$, $p<0.0001$). This indicates that we have managed to create two conditions within the same task which resulted in a more and a less demanding discrimination task while keeping the stimuli unchanged.

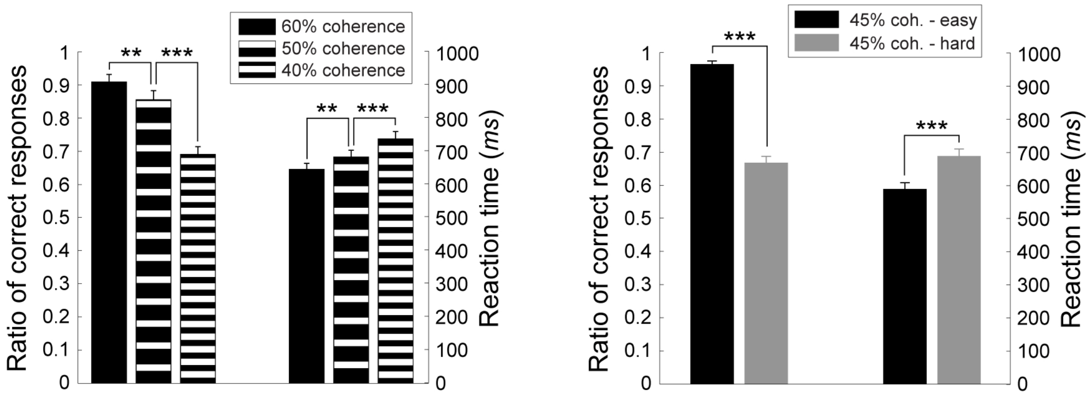

Figure S2. Behavioral results of the control experiment. (A) Both accuracy and reaction times were significantly impaired as a result of decreasing the phase coherence of the stimuli in the gender categorization task. (B) Difficulty modulation in the tilt discrimination task also led to a significant drop in performance and increased RTs. Error bars indicate ±SEM (N=14, ** $p<0.01$, *** $p<0.001$).

Results of EEG recordings of the control experiment

In the gender categorization task we found that, similarly to previous results (Philiastides et al., 2006) increasing the noise – i.e. decreasing the phase coherence of the images in steps contributed to a stepwise decrease in the amplitude of the N170 (main effect of noise: $F_{(2,26)}=99.43$, $p<0.0001$, with post hoc p values of $p=0.0005$ and $p=0.0001$ between increasing noise steps) and a stepwise increase in the amplitude of the P2 component (main effect of noise: $F_{(2,26)}=19.87$, $p=0.0002$, with post hoc p values of $p=0.025$ and $p=0.0001$ between increasing noise steps).

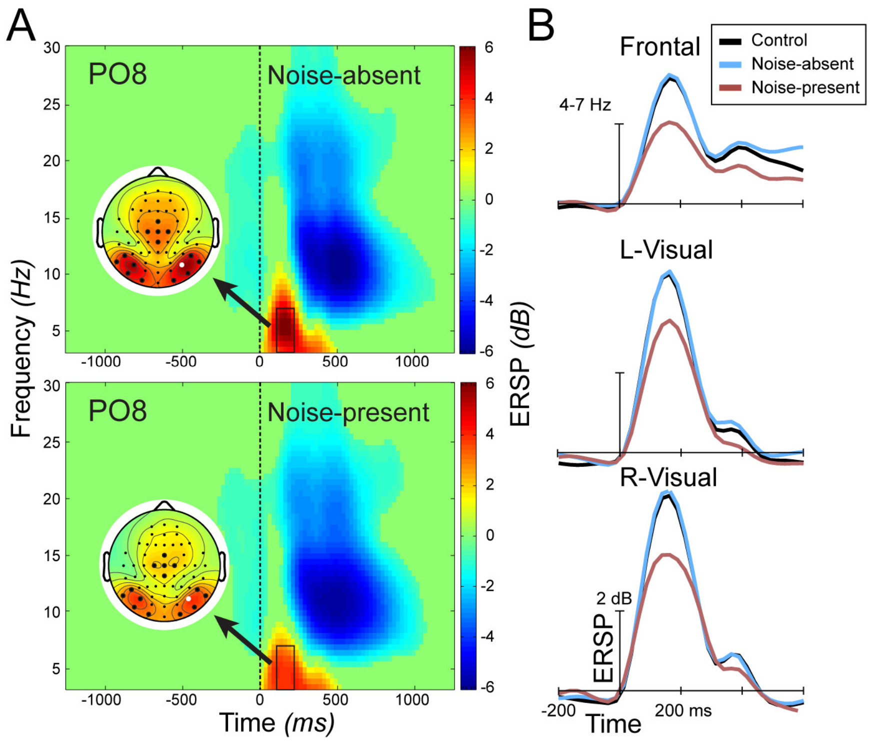

Figure S3. Grand average event-related spectral perturbation (ERSP) of the main experiment. (A) Relative spectrogram of a typical electrode (PO8 – position indicated by a white dot on cartoon heads) showing the N-a and N-p conditions above and below, respectively. Spectrogram of the C condition was very similar to that of the N-a condition and is not shown. Inlets show the ERSP topographies averaged over 100-200 ms and 4-7 Hz as indicated by the black boxes. Black dots show the three electrode clusters for which (B) ERSP time courses were calculated. C: black, N-a: blue, N-p: brown.

Results of the ROI analysis

In the object-selective areas the ROI analysis revealed significantly higher percent signal change in the noise-present condition relative to the noise-absent condition only. There was a significant main effect of condition in the case of bilateral VOT-mpFs (Fig.S4; $F_{(2,30)}$=8.23, p=0.003, p value for N-p vs. N-a p=0.001), while bilateral DOT-ITS showed a similar but non-significant trend (Fig.S4; $F_{(2,30)}$=3.26, p=0.058, p value for N-p vs. N-a p=0.043). Importantly, unlike in DOT-LOS, there was no difference in the VOT-mpFs and DOT-ITS activations between the noise-absent and control conditions. This was due to the slight non-significant decrease in activation observed in the more difficult noise-absent condition relative to the easy control condition. The above findings are consistent with the study by Heekeren et al (2004) where they found higher activations for phase-randomized faces relative to clear images of faces in the house responsive parahipocampal place area and similarly higher activation for degraded houses compared with clear pictures of houses in the face-selective FFA.

In the face-selective occipital face area (OFA) we found no significant differences either between the three conditions (Fig.S4; $F_{(2,30)}=0.78$, $p=0.47$) or between the two hemispheres ($F_{(1,15)}=0.07$, $p=0.79$).

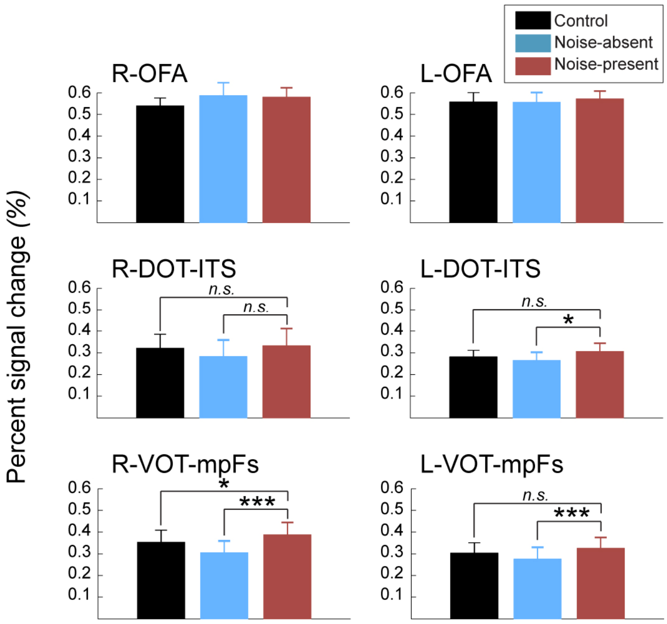

Figure S4. ROI analysis shows activations in the occipital face area (OFA) and the object-specific LOC subregions DOT-ITS and VOT-mpFs. Lateral occipital cortex (aLOC) and fusiform object area (FOA) (* $p<0.05$, *** $p<0.001$, *n.s.* not significant; DOT: dorsal occipito-temporal cortex, ITS: inferior temporal sulcus, VOT: ventral occipito-temporal cortex, mpFs: medial posterior fusiform gyrus).