Supplementary Methods

**Subjects.** 20 volunteers (age range 22-54, mean 32, 10 males and 10 females) participated in this study. All subjects had normal or corrected to normal vision.

**Stimuli.** We used photographs of natural scenes taken from a large commercial CD-ROM library (Corel Stock Photo Library) as stimuli. From this data bank, 1920 distractors and 960 targets were selected. Each was seen by every subject but randomly distributed across all series with all conditions counterbalanced to avoid any bias. Vertical photographs (384 by 256 pixels, sustaining about 8.4° by 5.6° of visual angle) were chosen to be as varied as possible. Animals included mammals, birds, fish, insects and reptiles... There was no a priori information on the size, position, or number of targets in any particular photograph. There was also a very wide range of distractor images that included outdoor or indoor scenes, natural landscapes (mountains, fields, forests, beaches...) and street scenes, pictures of food, fruits, vegetables or plants, buildings, tools or other man-made objects...

**Task and set-up.** Subjects were sat in a dimly lit room at 120 cm from a computer screen (resolution: 800 x 600, vertical refresh rate: 75 Hz) piloted from a PC computer. To start a block of trials, they had to place their finger on a response pad for one second. A trial was organized as follows (see supplementary Fig. 1). A stimulus (one or two photographs) was presented for two frames, i.e. 20 ms. Participants had to raise their finger as quickly and as accurately as possible (go response) each time an animal was present. Responses were detected using infrared diodes. Subjects had 1000 ms to respond, after which delay their response was considered as a no-go response. This maximum response time delay was followed by a 300 ms black screen, then by a 300-700 ms fixation point (0.1° of visual angle), resulting in a random 1600-2000 ms intertrial interval. When the photographs contained no animal, subjects had to keep their finger on the pad for at least 1000 ms (no-go response). An experimental session included 20 blocks of 96 trials in which target and distractor trials were equally likely. To prevent learning, each image was only seen once by each subject. Half of the stimuli contained one picture, the other half two pictures. When one picture was presented, it could appear on the left or the right of the fixation point (centered at 3.6° eccentricity) and be either a target (T) or a distractor (D) with no image (∅) on the other side. When two pictures were presented, there were either two distractors or a target and a distractor. Each block contained 12 trials for each of the 6
predictions from a parallel model of processing.

In the two-image condition, a simple model of parallel processing postulates that each of the two simultaneously presented images is processed by a separate and independent mechanism working with the level of performance reached in the one image condition and that the two outputs are then pooled together. When a single image is processed, the probabilities of hits and false alarms can be calculated from the experimental data: \( p(\text{Hit}) = 0.88 \) and \( p(\text{FA}) = 0.07 \). Thus, a correct response on a distractor trial (no-goDD) is only obtained when both distractors are correctly ignored: \( \text{no-goDD} = (1-p(\text{FA}))^2 \); expected value: \( (1-0.07)^2 = 0.865 \). For target trials, a correct response (goTD) is produced either by a hit in response to the target or by a false alarm to the simultaneously presented distractor: \( \text{goTD} = 1 - (1 - p(\text{Hit})) x (1 - p(\text{FA})) \); expected value: \( 1 - (1-0.88) x (1-0.07) = 0.888 \). As target and distractor trials are equiprobable, the overall probability of correct responses if both images are processed in parallel should be \( = (\text{NoGoDD} + \text{GoTD}) / 2 \) (expected value: \( (0.865+0.888) / 2 = 0.877 \). A global fall of accuracy from 90.4% in the one image condition to 87.7% in the two image condition is predicted by this simple parallel model. The expected result (87.7%) is very close to the observed value (86.7%).

Moreover, the same model can also be applied to evaluate performance over time at each successive 10 ms time step to generate the expected \( d' \) curve shown in Fig. 1b. The \( d' \) was calculated from the formula \( d' = z_n - z_s \), where \( z_n \) is chosen such that the area of the normal distribution above that value is equal to the false-alarm rate, and where \( z_s \) is chosen to match the hit rate. The very close fit between the observed and predicted \( d' \) curves for the two image results again supports the hypothesis that a parallel processing model can explain our experimental data.

EEG analysis. Electrical activity was recorded from 32 electrodes mounted in an elastic cap in accordance with the 10-20 system (Oxford Instruments) with the addition of extra occipital electrodes and using a Synamps amplifier system (Neuroscan Inc.). The ground electrode was placed along the midline, ahead of Fz. Impedances were systematically kept below 5 kΩ. Signals were digitized at a sampling rate of 1000 Hz (corresponding to a sample bin of 1 ms) and low-pass filtered at 100 Hz with a notch at 50 Hz. Potentials were on-line referenced on electrode Cz and re-referenced off-line by
subtracting the average of all signals from each signal. Baseline correction was performed using the 100 ms of pre-stimulus activity. Two artifact rejections were applied over the [-100 ms; +400 ms] time period: on frontal electrodes with a criterion of [-50; +50 µV] to reject trials with eye movements, and on parietal electrodes with a criterion of [-30; +30 µV] to remove trials with excessive activity in the alpha range. Only correct trials were averaged. ERPs were low-pass filtered at 40 Hz before analysis.

Four differential activities were computed by subtracting evoked potentials for distractors from evoked potentials for targets: DT - DD, TD - DD, ØT - ØD, TØ - DØ. Analysis concentrated on four groups of electrodes: occipital (left: T5, O1, O1', CB1, CB1'; right: T6, O2, O2', CB2, CB2') and frontal (left: FP1, F3, F7; right: FP2, F4, F8) where the differential activity was clearest.

**Latency of the differential activity.** To evaluate the start of a differential activity effect, paired t-tests (19 degrees of freedom) were performed at the p < 0.0005 level to compare the responses on target and distractor trials. The presence of 15 successive significant t values was used to index a differential effect (for similar strategies see Rugg, M., Doyle, M. & Wells, T. *J. Cogn. Neurosci.* 7, 209-227, 1995; Thorpe S.J., Fize, D., Marlot, C., *Nature* 381, 520-522, 1996).