**Can the unconscious be operationalised and measured?**

Levels of processing, response inhib/conflict (Stroop+stop-signal), SNARC, binocular rivalry (unconscious scary faces)

**Fig. 5**: **fMRI** higher **spatial** res. Confirms activity motor C

-Sig. change % is **equal to sum of overt and covert activity**

-Peak in lateralized BOLD response **(LBR) after response**

**-LBR smaller in incongruent trials -> only actual response effect or priming effect here rather than sum of both**

-**Authors:** Primes processed to **semantic level (ERP results)**

-Processing not only in sensory areas but also **motor areas (fMRI results)** -> narrows **search for consciousness**

**Fig. 4**: ERP scalp topography for prime and target related potentials

-Red box: **priming effect**, green box: **response effect**

-Prime-related activity is smaller (**distance from 0**) and earlier, but **similar in topography** to target-related activity

-processed similarly, only to a lesser extent

**Figure 3**: Lateralized readiness potential (LRP)

**3A**: Prime-target **congruity effect**: incongruent responses are 24ms slower

**3B top**: Synchronized to keypress to suppress effect of response delay

-LRP: Indexing of activation in motor networks in both sides

-Positive voltage deflections = **response preparation**, negative = **inhibition ->** We see an **early covert motor-response:**

-Activity in **C3 (controls right hand)** when **response is left hand** can “only” be due to **incongruent** primes -> further from keypress than C3 activity when response is right hand

-**C3, bold line is incongruent** (early activity due to prime)

-**C4, slim line is incongruent** (early activity due to prime)

**3B Lower**: to make sense of this, think of it as activity for just left or right hand

-**Congruent vs incongruent:** Deflections before positive waveform (response) shows the **covert motor activity** due to the prime. The prime either initiates or inhibits the overt motor response (**the shaded part**)

**Results: main experiment**

N = 12, 2x256 ERP trails

**Fig. 2: Response times in congruent vs incongruent trails**

-All 12 subjects showed a **positive priming effect**, 2-43ms (avg. 24 ms)

-Prime-target **congruity effect**: incongruent responses are slower (24 ms) -> **response competition**

-**2B**: **Response time distribution** was **shifted** by ~24 ms in **incongruent** trials compared with congruent trials.

-Effect is seen regardless of prime notation (letters/Arabic) -> **primes processed to semantically meaningful level**

**Pre-experiment:** Determining prime duration **(Table 1)**

**Task 1** (n = 6): Shown trials with and without primes (in variating durations), asked to discriminate between them

**Task 2** (n = 7): Shown numerical and letter primes, asked to discriminate between them

**Pre-experiment results**

-**43 ms** chosen as the masked prime interval, this is the **highest exposure duration which couldn’t be significantly discriminated** (discrimination is significant at 57 ms)

**Main experiment**: semantic categorisation of target numeral

N = 12, training sessions before test on each side

**Fig. 1:** targets <5 left, >5 right, counterbalanced within subject

**Congruent trials:** prime and probe **same** side of 5

**Incongruent trials**: prime and probe on **opposite** sides of 5

Researchers investigate how prime and target congruency affect **RT, ERP and fMRI**

**Semantic memory and priming**

**Hypothesis:** Masked primes can initiate a measurable but unconscious processing of prime stimuli – both semantically and motorically.

Dehaene et al (1998). Imaging unconscious semantic priming.