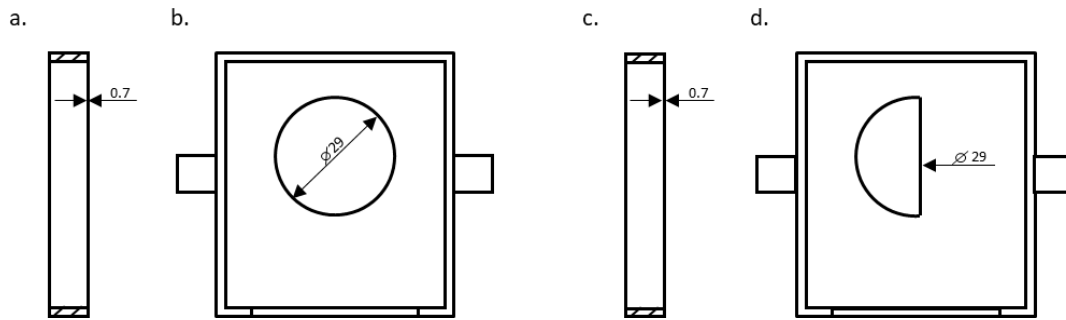


## S1 - Supplementary material 1

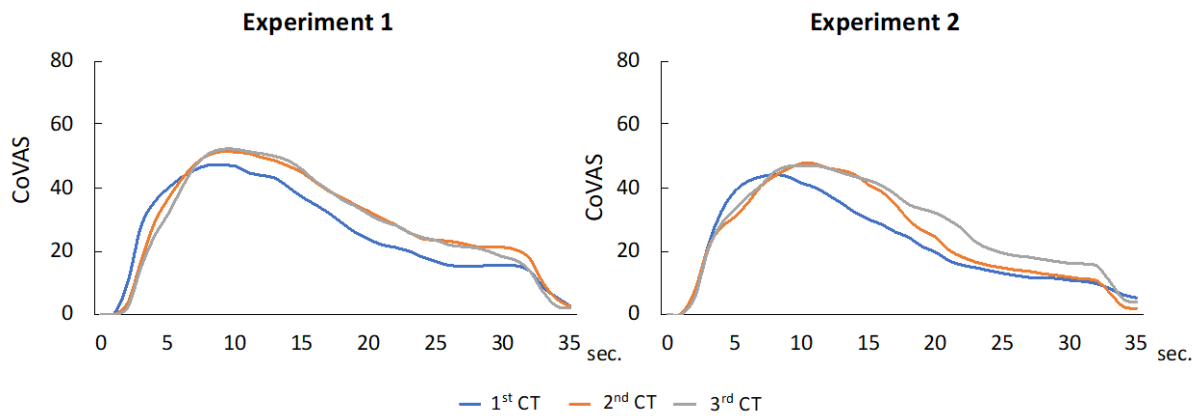
For the reduced stimulation area, two different self-made thermode covers were used (Figure S2). There was one cover for full stimulation area (full=6.6cm<sup>2</sup>) and another cover for semicircular stimulation area (half=3.3cm<sup>2</sup>). The covers were made of polyactide with a low thermal conductivity ( $\lambda = 0.18 \text{ W/mK}$ , width 0.7mm) and firmly attached to the thermode head size.



**Figure S1:** Schematic illustration of the thermode covers. Covers placed over the contact surface of the CHEPS to create two different stimulation areas. a. and c. cross section, b. view from top circle, d. view from top semicircle.

## S2 - Supplementary material 2

In order to determine whether carry-over effects occurred within or between the two experiments, the applied constant trials (CT1, CT2, CT3) were analyzed by averaging the pain response using the computerized visual analogue scale (CoVAS) for the entire trial (30 sec). Using a repeated-measures analysis of variance, neither in experiment 1 (CoVAS<sub>CT1</sub> 28.6 (SD 12.7), CoVAS<sub>CT2</sub> 32.5 (SD 15.8), CoVAS<sub>CT3</sub> 31.9 (SD 12.6);  $F_{[2,56]}=1.34$ ,  $p=0.27$ ,  $\eta_p^2=0.05$ ) nor in experiment 2 (CoVAS<sub>CT1</sub> 25.7 (SD 12.6), CoVAS<sub>CT2</sub> 28.8 (SD 16.6), CoVAS<sub>CT3</sub> 31.1 (SD 16.1);  $F_{[2,54]}=1.71$ ,  $p=0.19$ ,  $\eta_p^2=0.06$ ) differences in pain response were found by repetitive stimulation. Pain ratings regarding the two experiments are shown in Fig. S1.



**Figure S2.** Mean pain response using the computerized analogue visual analogue scale (CoVAS) for the first (1<sup>st</sup>), second (2<sup>nd</sup>) and third (3<sup>rd</sup>) constant trial (CT) in both experiments.

Considering the order in which the two experiments were performed (i.e. experiment 1 or experiment 2 first), there were, however, no significant differences between the CTs applied in each case (CoVAS<sub>CT1</sub> vs. CoVAS<sub>CT1</sub>:  $T_{[27]}=0.65$ ,  $p=0.52$ ,  $d=0.12$ ; CoVAS<sub>CT2</sub> vs. CoVAS<sub>CT2</sub>:  $T_{[27]}=0.11$ ,  $p=0.91$ ,  $d=0.02$ ; CoVAS<sub>CT3</sub> vs. CoVAS<sub>CT3</sub>:  $T_{[27]}=0.96$ ,  $p=0.35$ ,  $d=0.18$ ). Contrasting both calibration temperatures of experiment 1 (45.9°C (SD 1.0)) and experiment 2 (45.5°C (SD 0.6)), again no significant differences were found. ( $T_{[27]}=1.96$ ,  $p=0.06$ ,  $d=0.37$ ).

### S3 - Supplementary material 3

**Table S1:** Pain ratings during the first (T1), second (T2) and third time interval (T3) within each experiment.

| Time interval | Experiment 1<br>(n=29) |                | Experiment 2<br>(n=28) |                |
|---------------|------------------------|----------------|------------------------|----------------|
|               | Trial (full)           | Mean (SD)      | Trial (6.5°C/s)        | Mean (SD)      |
| <b>T1</b>     | CT                     | 45.05 (±17.51) | CT half                | 33.33 (±15.12) |
|               | OT slow                | 43.17 (±11.48) | CT full                | 42.30 (±18.22) |
|               | OT moderate            | 39.55 (±16.05) | OT half                | 29.50 (±16.88) |
|               | OT fast                | 38.45 (±17.60) | OT full                | 48.05 (±18.65) |
| <b>T2</b>     | CT                     | 48.11 (±17.06) | CT half                | 47.88 (±15.84) |
|               | OT slow                | 55.73 (±13.83) | CT full                | 45.22 (±18.25) |
|               | OT moderate            | 54.31 (±14.58) | OT half                | 50.86 (±19.10) |
|               | OT fast                | 55.79 (±17.16) | OT full                | 55.58 (±17.24) |
| <b>T3</b>     | CT                     | 21.74 (±17.60) | CT half                | 39.65 (±15.09) |
|               | OT slow                | 14.41 (±13.86) | CT full                | 16.05 (±14.21) |
|               | OT moderate            | 12.45 (±12.24) | OT half                | 23.68 (±14.15) |
|               | OT fast                | 12.58 (±12.37) | OT full                | 8.87 (±10.02)  |

Mean pain ratings (standard deviations, SD) in different time intervals: T1 (5-9 sec.), T2 (10-14 sec.) and T3 (22-30 sec.); CT, Constant Trial, OT, Offset Trials with different temperature fall and rise Rates during T2: fast (40°C/s), moderate (6.5°C) and slow (0.9°C/s) and stimulation areas: half = stimulation area, full = stimulation area.