1. RTs processing

The performances were analyzed in terms of RTs. Given that it is well known that the distribution of RTs is not normal [1,2], we used the natural logarithm transformation of RTs (ln) before trimming outlier RTs from the analyses. For each subject, each delay and each hemispace separately, we calculated the mean and the standard deviation of our transformed data. Ln(RTs) were considered outliers if they exceeded more than two standard deviations from the mean ln(RTs) and trimmed from the analyses (5.38% of trials for the audience experiment, 5.20% of trials for the collaborative experiment, 5.62% of trials in the competitive experiment). For the analyses, ln(RTs) were averaged for each subject and for each of the 44 conditions separately (2 HEMISPACE * 11 DISTANCE * 2 CONDITION). The means we obtained were transformed back with an exponential function.

2. Collaborative experiment

2.1 Outliers' participants

Among the participants, three participants had a high rate of misses in at least one of the social condition (isolated condition: 10% and 18.1% of miss, m±sd of the sample: 1.8 ± 3.8%, in a dyad condition: 14.5% of miss, m±sd of the sample: 1.2 ± 2.7 %) and were therefore excluded from the RTs analyses. The remaining participants were accurate in performing the task as the rates of omissions (0.70 ± 1.8%) can attest. We also excluded one participant from the analyses because his mean RT was substantially elevated (497.67 ± 127.76ms, m±sd of the sample: 364.55 ± 57.88ms), giving us reason to suspect that he did not correctly perform the task. There were twenty-six remaining subjects (14 females, age 24.08 ± 4.39).

2.2 Comparison between unimodal and bimodal trials

We first verified that multisensory integration globally speed up tactile detection in bimodal trials compared to unimodal trials. We conducted an ANOVA on the mean RTs, with the within subject factors DELAY (11 levels: Tactile_Before, T1, T2, T3, T4, T5, T6, T7, T8, T9 and Tactile_After). The global effect of DELAY was significant ($F_{(10,250)} = 61.23$, $p < .001$, $\eta_p^2 = .710$) suggesting that RTs were influenced by the time of tactile stimulation delivery (see figure S1 panel a).

RTs in the unimodal trials Tactile_Before were significantly slower than RTs in the bimodal trials T2, T3, T4, T5, T6, T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .001$ in all cases, suggesting that sound presence boosted tactile detection at those delays. RTs at Tactile_Before did not significantly differ from RTs in the bimodal trials at T1 (Post-hoc Newman-Keuls' test: $p = .967$). RTs

in the bimodal trials at T1 were also significantly slower than all the other RTs in the bimodal trials (at T2, T3, T4, T5, T6, T7, T8 and T9; Post-hoc Newman-Keuls' test: $p < .001$ in all cases) suggesting that, even though the sound started at the same time as the tactile stimulus delivery in that condition, there was no multisensory integration. Thus, RTs at T1 were excluded from the rest of the analysis.

RTs in the unimodal trials Tactile_After were significantly faster than RTs at Tactile_Before (Post-hoc Newman-Keuls' test: $p < .001$). Given that RTs at Tactile_After were significantly slower than RTs at T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .001$), we can exclude the possibility that participants were faster at late delays because of the increasing probability of receiving a tactile stimulation along trial.

2.3 Verification of the anisotropy of lateral PPS

We verified PPS anisotropy [3] by examining the effect of HEMISPACE on bimodal RTs. We conducted an ANOVA on the mean RTs with the within-subjects factors HEMISPACE (2 levels: Left/Right) and DELAY (8 levels: T2, T3, T4, T5, T6, T7, T8 and T9). The ANOVA revealed a significant main effect of DELAY ($F_{(7,175)} = 42.29$, p < .001, $\eta_p^2 = .629$). The analysis also revealed that the two-way interaction HEMISPACE x DELAY was significant ($F_{(7,175)} = 5.17$, p < .001, $\eta_p^2 = .171$), indicating that tactile detections were dependent on the temporal delay of tactile stimulation delivery from sound onset and the hemispace of origin of the sound source. The effect of the factor HEMISPACE was not significant. Thus, we analyzed the effect of the social manipulation with the other factors separately on the left and on the right PPS boundaries.

3. Competitive experiment

3.1 Outliers' participants

Among the participants, one had a high rate of misses (5.45% of miss, m±sd of the sample 1.24 ± 1.08%) and was therefore excluded from the analyses. The 29 remaining participants (16 females, age m±sd: 23.45 ± 4.15) were accurate in performing the task.

3.2 Comparison between unimodal and bimodal trials

We first verified that multisensory integration globally speed up tactile detection in bimodal trials compared to unimodal trials. We conducted an ANOVA on the mean RTs, with the within subject factors DELAY (11 levels: Tactile_Before, T1, T2, T3, T4, T5, T6, T7, T8, T9 and Tactile_After). The global effect of DELAY was significant ($F_{(10,280)} = 76.34$, $p < .001$, $\eta_p^2 = .732$) suggesting that RTs

64   were influenced by the time of tactile stimulation delivery (see figure S1 panel b).

65   RTs in the unimodal trials Tactile_Before were significantly slower than RTs in the bimodal

66   trials T2, T3, T4, T5, T6, T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .001$ in all cases),

67   suggesting that sound presence boosted tactile detection at those delays. RTs at Tactile_Before also

68   significantly differed from RTs in the bimodal trials at T1 (Post-hoc Newman-Keuls' test: $p = .011$).

69   RTs in the bimodal trials at T1 were also significantly slower than all the other RTs in the bimodal

70   trials (at T2, T3, T4, T5, T6, T7, T8 and T9; Post-hoc Newman-Keuls' test: $p < .001$ in all). Thus T1

71   significantly differed from Tactile_Before, but also to all other bimodal trials. The expected behavioral

72   effect of multisensory is an acceleration of RTs around 25ms at least (as seen in the other two

73   experiments, and in the literature [4,5]). As Tactile_Before differs from T1 of 7ms and from T2 of

74   24ms, it is likely that the stimulation was not perceived as bimodal. Thus, T1 was excluded of the rest

75   of the analysis.

76   RTs in the unimodal trials Tactile_After were significantly faster than RTs at Tactile_Before

77   (Post-hoc Newman-Keuls' test: $p < .001$). Given that RTs at Tactile_After were significantly slower

78   than RTs at T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .001$), we can exclude the possibility

79   that participants were faster at late delays because of the increasing probability of receiving a tactile

80   stimulation along trial.

81

82   **3.3 Verification of the anisotropy of lateral PPS**

83   We verified PPS anisotropy [3] by examining the effect of HEMISPACE on bimodal RTs. We

84   conducted an ANOVA on the mean RTs with the within-subjects factors HEMISPACE (2 levels:

85   Left/Right) and DELAY (8 levels: T2, T3, T4, T5, T6, T7, T8 and T9). The ANOVA revealed a main

86   significant effect of DELAY ($F_{(7,196)} = 44.27$, $p < .001$, $\eta_p^2 = .613$). The analysis also revealed that the

87   two-way interaction HEMISPACE x DELAY was significant ($F_{(7,196)} = 2.90$, $p < .01$, $\eta_p^2 = .094$),

88   indicating that tactile detections were dependent on the temporal delay of tactile stimulation delivery

89   from sound onset and the hemispace of origin of the sound source. The effect of the factor

90   HEMISPACE was not significant. Thus, we analyzed the effect of the social manipulation with the

91   other factors separately on the left and on the right PPS boundaries.

92

93   **4. Audience experiment**

94   **4.1 Outliers' participants**

95   Among the 28 participants who took part to the Audience experiment, two had a high rate of misses in

96   at least one of the two social conditions (Isolated condition: 15.9% of miss, m±sd of the sample: 1.4 ±
97   3.1%; In Dyad condition: 17.3% and 28% of miss, m±sd of the sample: 2.7 ± 6.4 %) and were
98   therefore excluded from the RTs analyses. The 26 remaining participants (11 females, age m±sd:
99   25.27 ± 3.58) were accurate in performing the task as the rates of omissions (0.87 ± 2.0%) can attest.

100

4.2 Comparison between unimodal and bimodal trials

102   We first verified that multisensory integration globally speed up tactile detection in bimodal trials
103   compared to unimodal trials. We conducted an ANOVA on the mean RTs, with the within subject
104   factors DELAY (11 levels: Tactile_Before, T1, T2, T3, T4, T5, T6, T7, T8, T9 and Tactile_After).
105   The global effect of DELAY was significant ($F_{(10,250)} = 50.30$, $p < .001$, $\eta_p^2 = .668$) suggesting that
106   RTs were influenced by the time of tactile stimulation delivery (see figure S1 panel c).

107   RTs in the unimodal trials Tactile_Before were significantly slower than RTs in the bimodal
108   trials T2, T3, T4, T5, T6, T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .001$ in all cases),
109   suggesting that sound presence boosted tactile detection at those delays. RTs at Tactile_Before did not
110   significantly differ from RTs in the bimodal trials at T1 (Post-hoc Newman-Keuls' test: $p = .260$). RTs
111   in the bimodal trials at T1 were also significantly slower than all the other RTs in the bimodal trials (at
112   T2, T3, T4, T5, T6, T7, T8 and T9; Post-hoc Newman-Keuls' test: $p < .001$ in all cases) suggesting
113   that, even though the sound started at the same time as the tactile stimulus delivery in that condition,
114   the auditory stimulus was not perceived by participants. Thus, RTs at T1 were excluded from the rest
115   of the analysis.

116   RTs in the unimodal trials Tactile_After were significantly faster than RTs at Tactile_Before
117   (Post-hoc Newman-Keuls' test: $p < .001$). Given that RTs at Tactile_After were significantly slower
118   than RTs at T7, T8 and T9 (Post-hoc Newman-Keuls' test: $p < .02$), we can exclude the possibility that
119   participants were faster at late delays because of the increasing probability of receiving a tactile
120   stimulation along trial.

121

4.3 Verification of the anisotropy of lateral PPS

123   We verified PPS anisotropy [3] by examining the effect of HEMISPACE on bimodal RTs. We
124   conducted an ANOVA on the mean RTs with the within-subjects factors HEMISPACE (2 levels:
125   Left/Right) and DELAY (8 levels: T2, T3, T4, T5, T6, T7, T8 and T9). The ANOVA revealed a main
126   significant effect of DELAY ($F_{(7,175)} = 35.99$, $p < .001$, $\eta_p^2 = .590$). The analysis also revealed that the
127   two-way interaction HEMISPACE x DELAY was marginally significant ($F_{(7,175)} = 1.81$, $p = .08$, $\eta_p^2 =$
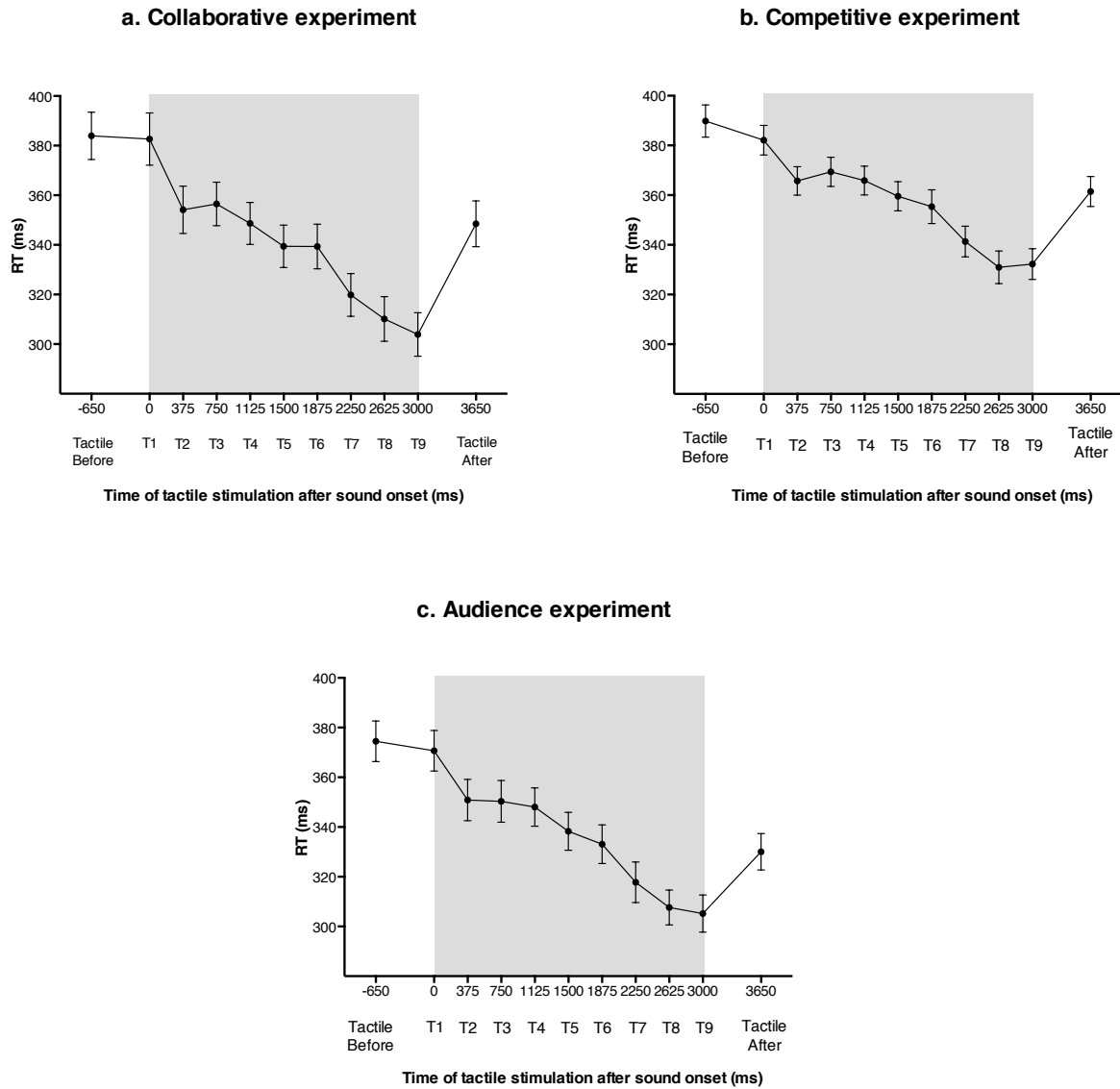128   .067), suggesting that tactile detections might be dependent on the temporal delay of tactile

129 stimulation delivery from sound onset and the hemispace of origin of the sound source. The effect of
130 the factor HEMISPACE was not significant. Thus, according to the results of the two precedents
131 experiences and of the literature, we analyzed the effect of the social manipulation with the other
132 factors separately on the left and on the right PPS boundaries.

133

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145

a. Collaborative experiment

b. Competitive experiment

c. Audience experiment

146

147 **Figure S1. Impact of sound presence on tactile detection**. Those figures reports participants' mean
148 tactile reaction times (±SEM) as a function of the delay of tactile stimulation delivery from sound
149 onset, on bimodal trials (from T1 corresponding at the sound onset, when the sound is the furthest
150 from participants' body to T9 corresponding to the moment when the sound is the closest from
151 participants' body) and on unimodal trials (Tactile_Before, Tactile_After) in the collaborative
152 experiment (**panel a),** the competitive experiment (**panel b),** and the audience experiment (**panel c**).
153 The shaded region indicated the duration of the sound. Sound presence boosted tactile detection in
154 bimodal trials, expect in T1 in which tactile stimulation occurred at sound onset.