Supplementary data

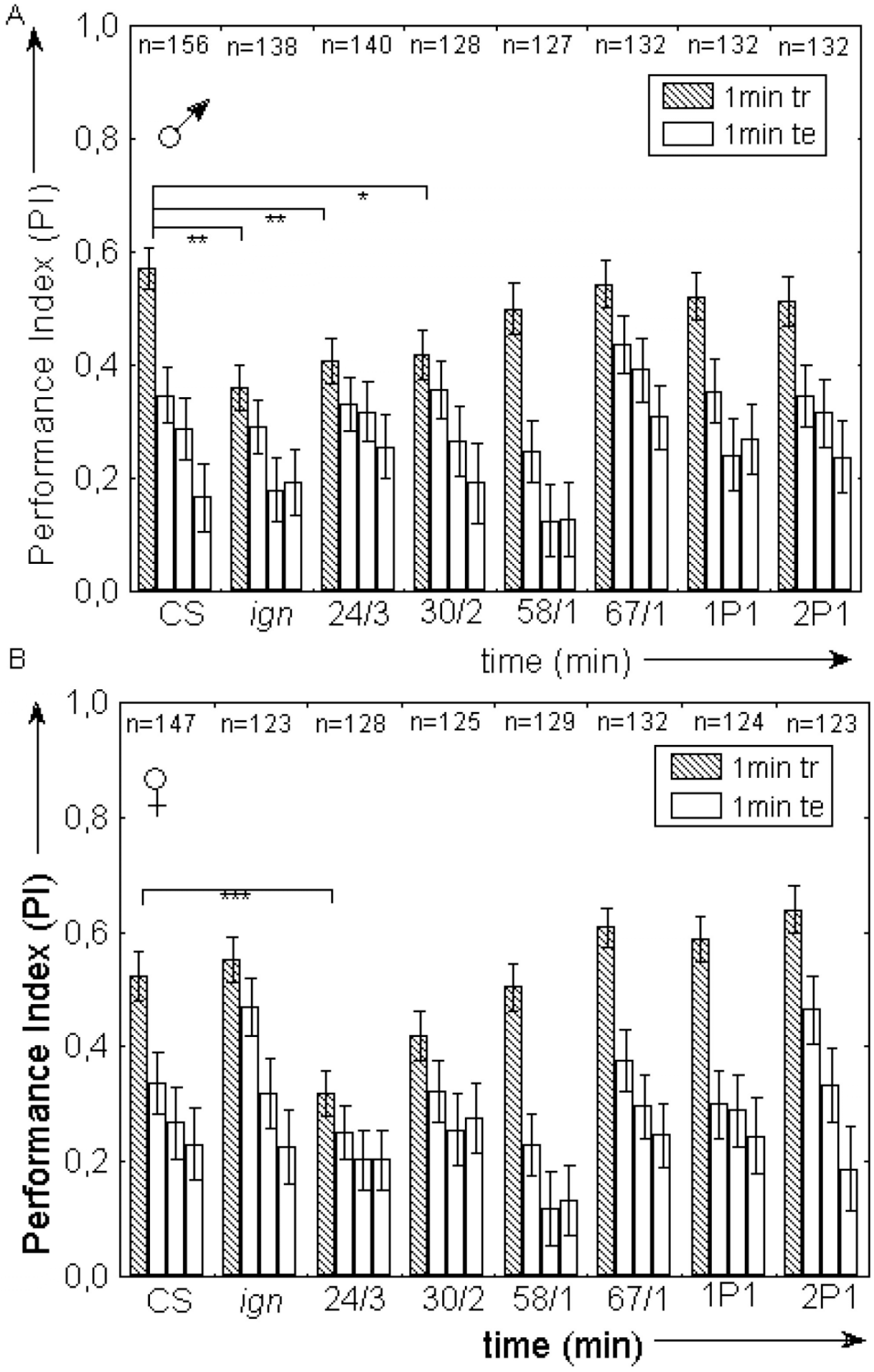

Fig. S1: Performance index in place learning in the heat-box for the last min of training and the three min memory test. The graphs show the transposon mutant ignP1 and the six P-excision lines investigated on CantonS genetic background. Note that the defect of the 2.2 kb N-terminal deletion $Df(1)^{\Delta 30\text{-}2}$ is significant only in males (U-test, Z=2,50, $p<0.05$). Females still show a tendency of a low PI, specially in comparison to the PIs of the large deletion $Df(1)^{\Delta 67\text{-}1}$ and the precise excision lines.

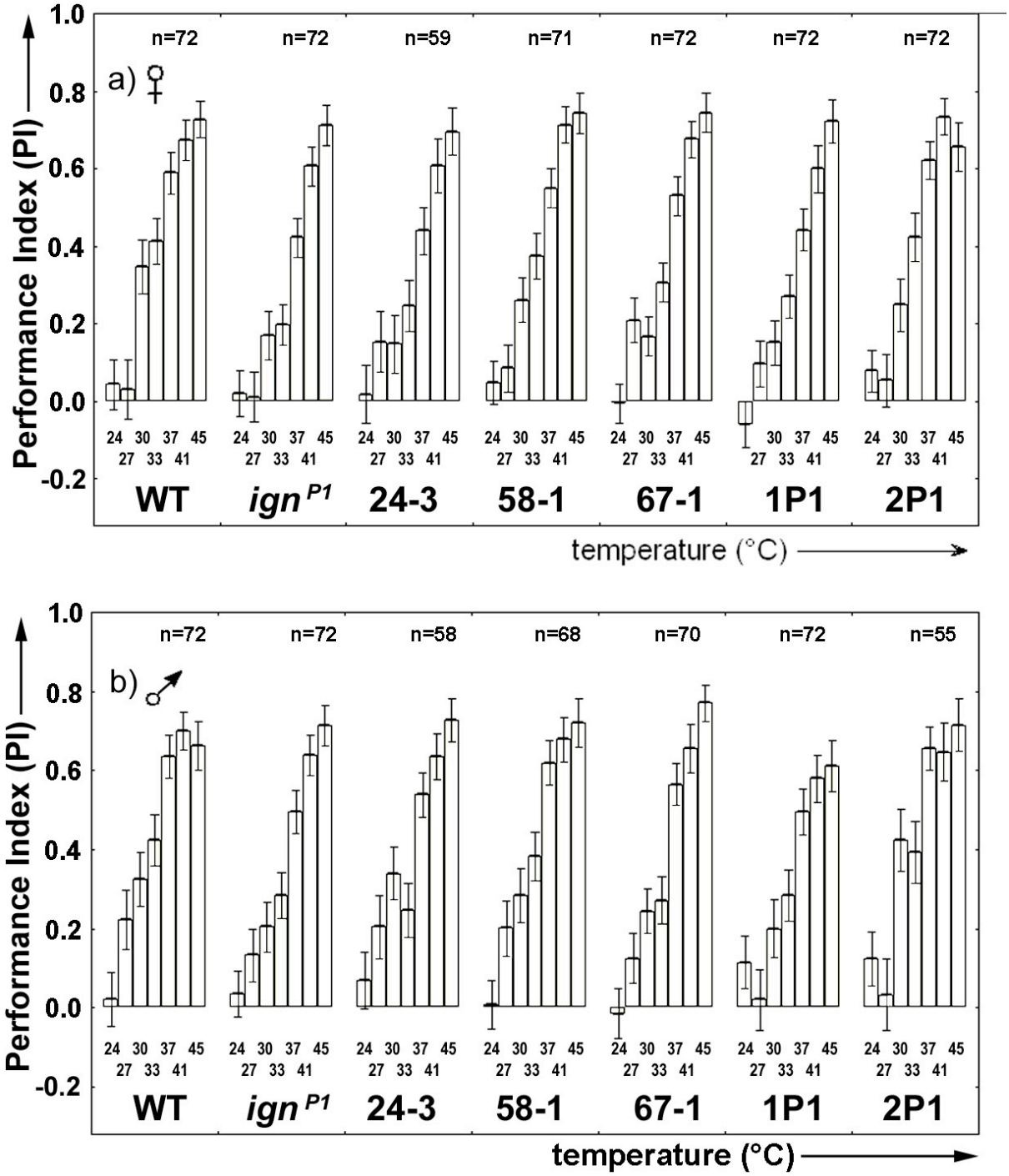

Fig. S2: *ign*^{P1} mutants and jump-out lines do not have impaired thermosensitivity. The thermo-sensitivity assay uses a chamber with Peltier elements that can be independently controlled in the front and back half of the chamber (Zars, 2001). A reference temperature of 24 °C is always kept in one half of the chamber, while the other half is stepped to 27 °C, 30 °C, 33 °C, 37 °C, 41 °C, or 45 °C. The side of the chamber set to the reference temperature changes after 60 sec, thus forcing flies to make decisions about their preferred temperature. All points in the chamber reach their final temperature within 2-6 sec. The PI is calculated as described in the learning experiment. Each bar represents a 1-min test period. A positive value indicates that the flies spent more time in the 24 °C area. Results are shown separately for (a) females and (b) males.

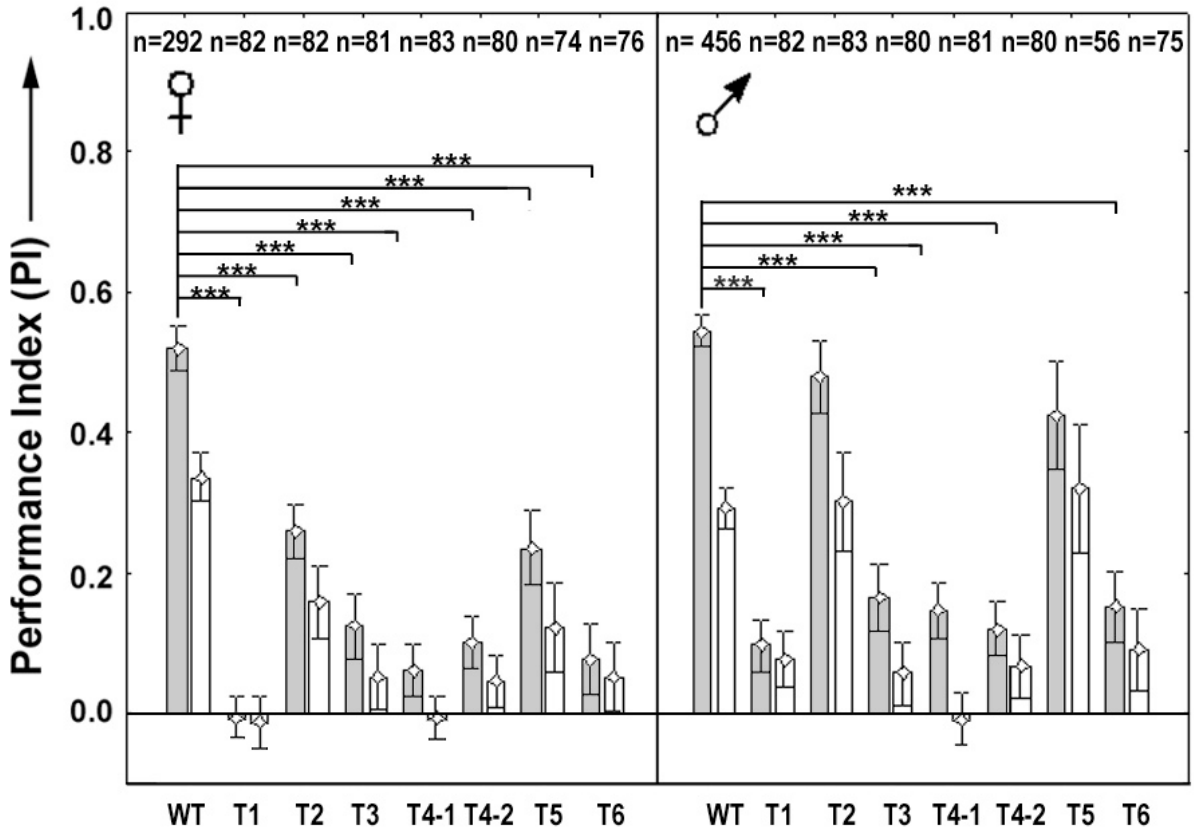

Fig. S3: Over-expression of the *S6KII* transgene impairs place learning in the heat-box in all seven transgenic lines. PIs of the last minute of training and 1-min memory test are separately shown for females (a, U-Test, T1: $Z=9.07$, $p<0.001$; T2: $Z=5.39$, $p<0.001$; T3: $Z=6.79$, $p<0.001$; T4-1: $Z=8.13$, $p<0.001$; T4-2: $Z=7.58$, $p<0.001$; T5: $Z=4.91$, $p<0.001$; T6: $Z=7.22$, $p<0.001$) and males (b, U-Test, T1: $Z=8.18$, $p<0.001$; T2: $Z=1.67$, p=n.s.; T3: $Z=6.72$, $p<0.001$; T4-1: $Z=7.52$, $p<0.001$; T4-2: $Z=7.80$, $p<0.001$; T5: $Z=1.52$, p=n.s.; T6: $Z=6.59$, $p<0.001$).

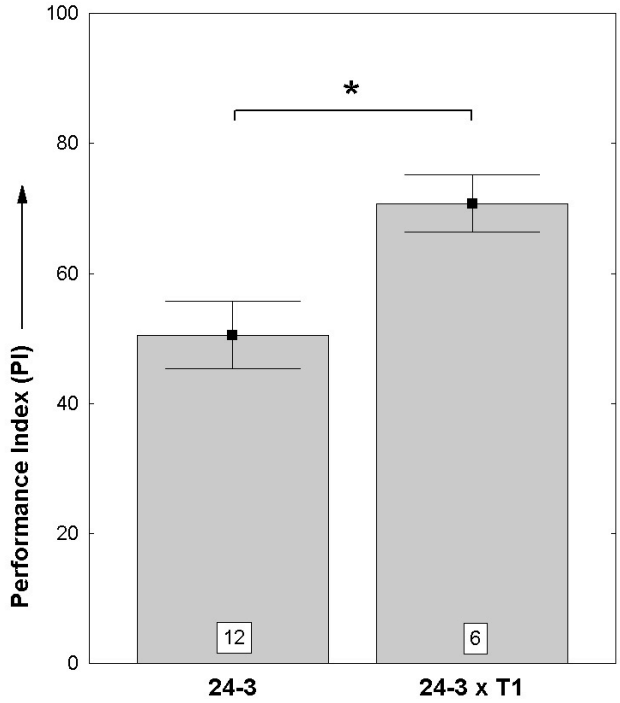

Fig. S4: The defect in 3-min olfactory memory in the mutant *Df(1)*$^{\Delta 24\text{-}3}$ is rescued by a single copy of the genomic transgene (T1). Only males are recorded. Statistical treatment below.

Line	Mean	N	SEM
WT	62.0	6	4.5
24-3	50.5	12	5.2
24-3 x T1	70.7	6	4.4

ANOVA Test	
F	**p**
3.777	**0.039**

Duncan-Test			
	WT	**24-3**	**24-3 x T1**
WT		0.165	0.287
24-3	0.165		**0.024**
24-3 x T1	0.287	**0.024**	

Control experiments for Pavlovian associative conditioning:

Olfactory acuity test:
1) Benzaldehyde:

GROUP	Mean PI	N	SEM
WT	90,8	6	2,7
58-1	90,3	6	3,1
24-3	85,9	6	3,1

One-way ANOVA:

	F	p
PI Benz	0,79	0,47

2) 3-Octanol:

GROUP	Mean PI	N	SEM
WT	80,9	6	8,0
58-1	82,2	8	5,3
24-3	81,2	6	2,3

One-way ANOVA:

	F	p
PI Oct	0,02	0,98

3) Electric shock sensitivity:

GROUP	Mean PI	N	SEM
WT	72,2	6	6,4
58-1	64,7	6	7,5
24-3	76,9	6	4,6

One-way ANOVA:

	F	p
PI e-shock	0,97	0,40