Behavioral/Cognitive

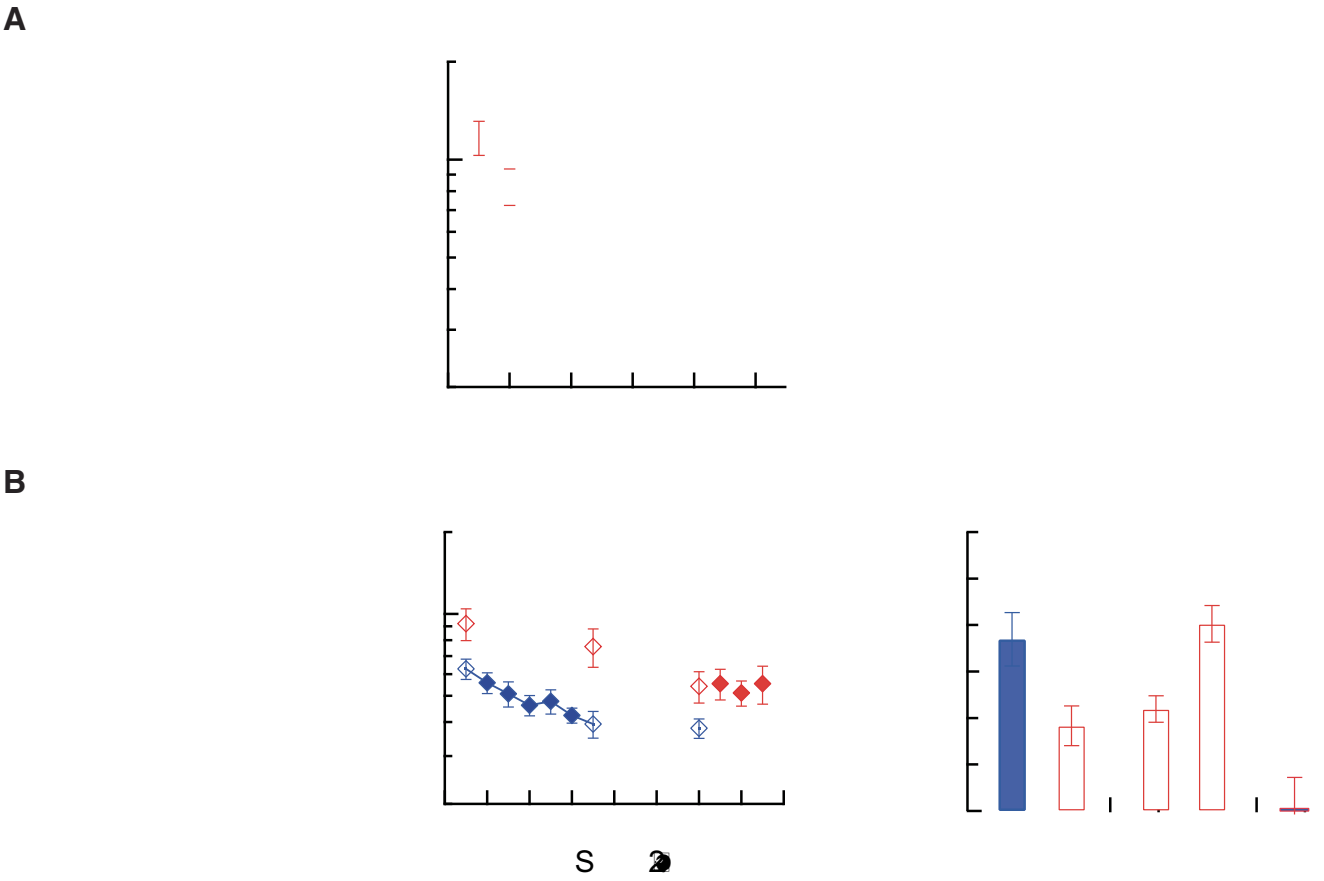
Perceptual Learning at a Conceptual Level

Rui Wang,[1,2]* Jie Wang,[1]* Jun-Yun Zhang,[2]* Xin-Yu Xie,[2]* Yu-Xiang Yang,[2]

ca , , , , e a , , a d , g d ec , , (H be a d W e e , 1959, 1962). Tho ef e, V PL , f e o , e ed a a g- d ced cha ge , ec f c he , b e , f V1 e , e c d g he a ed , , (Ka a d Sag , 1991; Sch , e a ., 1995; Te ch a d Q a , 2003), a , , ed ead , f V1 e , g a , ec f ca ac a ed b he a ed , , (M a d Da a, 1996;

(ee Ma a, a d Me h d; Fg. 4). I a e a ea g h eg a g (34.0 ± 5.1%, = 0.001, C he ', = 2.724) had a a a d g fca ac d a e a d a (9.7 ± 7.0%, = 0.22, C he ', = 0.57), b b e d a e e, b a a ed d a e a d a (26.3 ± 4.5%, = 0.002, C he ', = 2.37). Th TPE ced e a ed he b e ' d ab beca e f h de a a g h he a d f h ed ce he h d (−0.3 ± 5.8%, = 0.96, C he ', = 0.02). The e h age e c ded a e a c b fc e a ea gd g hee e, ha e.

We h ed ha TPE e ab ed ea g a fo f g a g d a , b h e a a b ha hee e, ha e a e c d e a d a h d a e . A h e e ed h b . The e e a de g a a ha Fg e 4 e ce ha h e a a g a a g. A h



The a e a a f ea g a fo e e ca ed - - d ec d a a . The e a e- d a ed (f -) - - g a, (Fig. 5) de ab e b ca ea f a d c a - d a ed (ec d -) - - g a, (F g. 5) de ec ab e b ea echa - (L d S g, 2001; A h da e a ., 2007). Af 5 e f ac ce (16 b c f a, e) h he ec d - d , 6 b a ed he d ec d a f he ec d - d b 45.9 ± 9.3% (= 0.00 , C he ' = 2.0; F g. 5), a d he ea g, g f ca a fo ed he

O c e , (F g . 4, 5) e c ded he , b ha e , e h gh- do , a ec d e , ce - a ea g, d ca g ha e , e ac h a g f - do , d ce ea g a fo . H e , e- a , ac ha e he e , e, a he TPE , ed e. P e , e h ed ha TPE ca e ab ec - , e ea g a fo a ed h g a e a f he a e , (J.Y. Zha g e a ., 2010). We ha e e - de ce ha e c e a e a , ec f c d be a e f ff ce b - , a f, -d a - e , he ed , e a . Theef e, he e , e f he h g a e a he TPE , ced e c d a ed he eh - , a d , -d , e ab e ea g a fo (X. g e a ., 2015). F ho , d e a e ece - a ec da e ha e e h, do a d g ca a , - he c e , d a d he ho add a fac , a c e - , a .

O , e , f d g f ea g a fo a ed ca- , e a , , a d d ec , gge ha VPL , e-ba ed ea g ha he ea ed e eh g e ca be a , ed - a ed c d , a ea g a fo (X a e a ., 2008; Wa g e a ., 2012, 2014; Zha g a d Ya g, 2014; X. g e a ., 2016). O c e da a , , ec a e ha he e ea ed a d ef ed f , c a g , be a ca a e. E e a , e, h a e e , b e f a g g a egh a e ' , e, he ba f , a da d c e a d , b f e a e , e a o ha h ca , - ac a e he e e , e e , e d ha c ca e e f e e c de he . C e h h , b da a h ha , a h gh- , a g a d ffe e , ec - e e , a g c a a d h gho - do , g a, ead a , a a f , e e f d , a f - - do , gh (42.8% , 35.1% f e a a g, = 0.12, C he ' = 0.44; 45.9% , 36.8% f ea g, = 0.22, C he ' = 0.37; F g . 1 , , 5). The e e he a g he e , e do , g he TPE , ced e (40.1% , 35.0% f e a ea g, = 0.30, C he ' = 0.29; 36.9% , 40.3% f ea g, = 0.54, C he ' = 0.27; F g . 2 , , 5). The a ea g a fo a d he , a , e e a e be e h, ca d, c , a e h e f a ece a a d o a ea g echa , ha e e - d d ga d e , e e egh g. N e ha e g he a , -

Ma he N, L Z, Gee a a BJ, Q a N (1999) Pe ce a ea g- e a a d d ec d a . V Re 39:3692 3701. G Ref Med e

M da a S, Ba he M, a d Se TJ (2014) T -d e ha c e a e ec e f he a c e d g ce a ea g. PL S C B 10(8), e003770. G Ref

M JD, Da a MV (1996) Th e e a ce a ea g. S a V 10:51 58. G Ref Med e

Pe DG (1997) The V de T h f a e f a ch h c: a f g bo e . S a V 10:437 442. G Ref Med e

Pe AA, Ha e TR (2010) A e c a fo f ce a ea g f a ce-a d c a -d ed . J V 10:11.