

A tale of two frequencies: Determining the speed of lexical access for Mandarin Chinese and English compounds

N a

CNRS & U iwe ixe de P ve ce, Ma eille, F a ce, a d Ha va d U iwe ixi,
Ca b idge, MA, USA

a ca

Beiji g N al U iwe ixi, Beiji g, P. R. Chi a, a d Ha va d U iwe ixi,
Ca b idge, MA, USA

f a a m zz

Ha va d U iwe ixi, Ca b idge, MA, USA, a d Ce xe f Mi dlB ai
Scie ce, U i e ixi f T e xi, Ixal

Tw ct a m g x m t w t a t c m w ct
Ma a a a g x m t m y t c m , w -
w f c g t y t g tt tm m f c y F c t
x m t t a t t ta a y c g t a t c a t y
c T ta c t tw t m f x g a cc a a m
c m a t t f -f ma t a t f c a y ff c t t a

N S & U c a N a h a t g g t x
Fa c m : a t c , a c Vct H g - a . 1 1 Ma g g t x
Fa c m : a t c , a c Vct H g - a . 1 1 Ma g g t x
a La g N m U t y g 1 a g m : ay ca
m c m g N m U t y g 1 a g m : ay ca
g T a c t w t N y HG a t D t f a a m zz
x m t k a l w t a t t t a t a f c f g t Sc c
g a . g g t 1 ya ca x m t a a w g t a t t T
a g w t g y S m N a at Ma c N a N
a f w f m t F y F a t W t a g m a a m a t c t a
a m w f f c m m t a c f m a a m a t c t a

© g g y a m t f t T y & Fa c G a f m
tt : www y c m c D : 1 1 . .

fw w T t tc a tt t fm
 t a ta tagt cm w ct Ma a
 , a ff f g m t y t cm w
 ct Dt T tyat t c t cay t c -
 g tc at ff c c

Keywords: m F c y h g g ct M g y ct
 a m g

Ma y a g c at w a a c m t fw m t
 w : m gg g c at w a a c m t fw m t
 c t fw x t w g w a m t c m w w m
 w a af yc mm a a tm t yc g t gg g c
 x a at a w c c at a t (t) cc c f m a
 c m F t x m a c m t t a
 w t y t t m at x T a a t a t w
 y t t dec i j h he i w ca m t att
 a t a t f x at t a t w c c m a
 t t m ft c tt t x m m T a t a t
 w t f ll f e e e x j h he i (f - t g y t),
 a m a t yw w f m a t t t x a
 a t a w ' a t a t y a y x a cc (,
 tt w t, l h a a a c & a a m z a, 1)
 L t fa M y () a a m f x a cc
 a a g ct a t x c t y c a t t c m t
 y t g f c m T m a m t a t w f
 x a at t t g tw t m tca
 c t t fw : t mma a g xm (a D, 1 G a g g
 1) T mm a a t yat c t c a t m) t t
 a mma t a t f w (g a mma t a g f m f x a a mma t a
 m m f t a a g g t m , a w c a w m
 t a a w w (w m) a t t mma , a t
 t t m f t c tt tm m - w a m: a t t
 xm c m t c at t f t a c t c t w
 F g la
 T c m t y t c m a t w t m f x
 a cc a t a m t a t g x a y tw t
 m t a t g c t t fw (g g a a m z a, 1) S c
 m a m t a t x c m a g t a w w
 a t a t c t t tm m t a y x a cc
 (F g 1) T , c w g t c m a t
 t m g f t c t t tm m g w m m f a g g

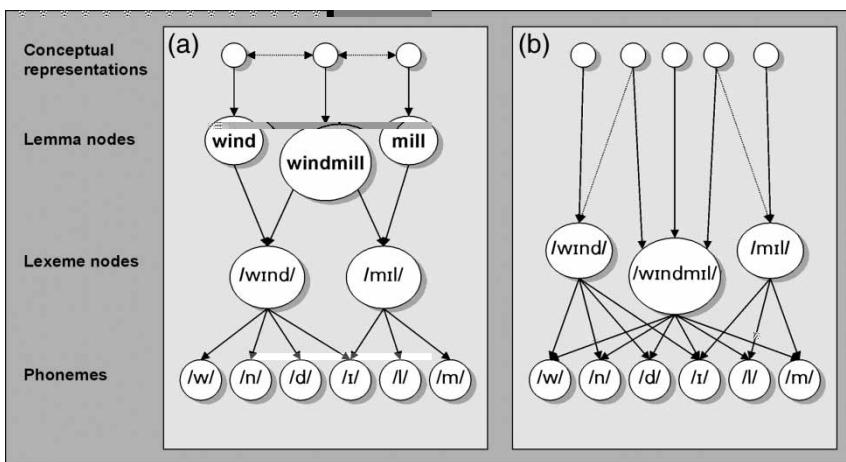


Figure 1. Semantic network diagram showing conceptual representations, lemma nodes, lexeme nodes, and phonemes.

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at t tw -at g (a) g -at g
 () m f x a cc

c t a a m t a t t	y g i x a y tw t
m tca t t g c t t fw	t t g tw t c m t a f -f m
at t y t g c c wa m a t f	f c y a a g t y a a ct a c
w f c y a a g t y a a ct a c	ta g t ct a m g f & W g f , 1.6) t g a y
w f c y a a g t y a a ct a c	ta ff c y a ff c t t a f t g c t , a m a t t
c g t f t ct (g m a K , F & a a m z a ,	G ff & c , 1 g c a & L , 1 W f , 1.6)
1.6 t K & tt , 1) T ff c t fw f c y c	c t a f m t a a ct ft x a cc
c (g a a m z a , at M z z , & , 1 D , 1 G ff &	c , 1 c a & L , 1 H w , t t att f c
ff c t t a g t f w t t c m a t f m -	t m a g t t a c t c t a c g y m c f t
x y t m , t c f t f c y ff c t t y t m a t w y	w c f c y a m t a ff c t c g

N t a t t	tt T a t , ca a g tt c m t y t f
c m w tc t t t ca a g tt m m xm t c t T x	t f -f m at t y t g m m t a x a cc y t m a t
t g tw m m a xm x a y y m g a t c m a	t a w w a t t f at t T a t , x g m t a a m a
t c t tw m m a xm a c m a t w t t t c m t a	t f -f m y t f c m

yL t a ()

t m t a m a t c m a t t t m f t
 c tt tm m a t t xm a a t t f c ya a
 a ffct t t a f xm at t (c a & L t1)
 t a f t a m t w x c t a t t f c y f
 cc c f t m m c t t g t c m w t
 ca t m a t f a m g a t c y F axm , a m g a t c y
 t ct f t c m g w m , t m g y t
 f c y f t m m c t t w 'a m , -a he e
 f e e c effect -a t t f c y f t c m a a w
 t a t y a c c g t t f -f m m y a a m z a
 (), c m a t t f -f m a t t x
 f t f t a m a t f c y a t f f c a t t ,
 w x c t a t t t f c y f c c c f t c m w
 t a a f f c t a m g a t c F axm , f t c t f t
 c m w m g tw t f c y f c c c f t w
 w m , t a t w t m x t a t m -a h le- d
 f e e c effect

T t a t w a t a w t t c t
 fc m t t m m w w f c y
 t a t a t a t t a t f c t t t
 F t a m m f g c y f f c t w f t t y f f
 (a) t t y a t c a t f t a m t f a a t
 w a (g c c m a w f a m a t) t x -
 m a t a t g f t w f t a a w t t
 c m t c a t a t c a t w a t c t c
 w f t a (a M y, 1 , 1 1) t a t g t w w
 D t m a y c c m a t f c y f t f t
 c t t t f t c m w t g w f c y
 a t , c m c t t a c g t w c t x : a
 m g t a c t t f a t g c t x w
 c m c c c t t a g t a t a
 c t t t T t w t a t w a m ffct f c t x
 (m a f c a t t), m y f c t g t a a a t g t a c c f m
 a g t a t a g c t t t g m g t
 a g t t t g t M m a t t f f t
 , t c t x f f c t w a g w t w a

N t a t w t a t a a m t a t c m a t a a g c t f f t
 c t c m a t t z ff c y f f c t f t f a g c m m
 H w , t f t a m t , t m c t a t T c a w t
 c a g a g m m f c y

w-f c y(m) g-f c yc tt t (m) T
 a g afc at t f w- a g-f c yc tt t w
 x a y m g t a t w-f c y c tt t at g t
 c a t f g ft m f m g t m g
 c t t a f t t, fa g t a t c m g
 w ct t t m m f c y g
 ma a tt f t w f a t y y L ja
 aa y () T g t t y f a w ma t a t
 y f (l a) L f' t ya tca tw a t a f
 D t c m w m a m t - g c c m a at g t
 ct t a c t c t x a at w c w g
 c t a a f a t c H w t t y f
 f t c t x a a w t m a t f x m t t
 f c y f t a f t c m (m t D t c m a g t
 a), t f c y f t m f t f c y f t t a a g t
 t m f a t w w f c y w m a t T t
 a a m m f c y ffct: f t a (l m), t
 m f (m), t a a t m f (m), t t f t w -
 w f c y
 c a t t t w t a t y y a (l)
 w t a t c m w c t Ma a w t
 t t m m f c y T a a m t t w t a
 t t y f (l a) t f x m t t m m
 f c y f t c m f t c t t w m a t w t
 w w f c y f t c m w c t a m -
 a t f t c t x a a w c L f' t y t t
 a a a ffct f c t x (m), f t t f
 f t ffct f c t x w t m a t y t f c y f t
 c t t t T c t x ffct w a a g w c m a w
 f c y c t t t (m) a w c m a f c y
 c t t t (m) T a c f a m m f g c y ffct
 t t yat c a t t t t f f (l a) a
 a ()

a t t w w f c y T t a t t
 t m f a m t a m a a a - t f c m a
 w w a cc g a w c g t (Sc & aa y,
 1)

F a y t a t f c m w at t a t y
 ta g t y a a m t f t t ty f c m w
 c t t w w m m f c y a y ta g t-
 a g t t ty t m g ffct a f t y▲w t
 a g c a g (D m , g & ▲w t , ▲w t , t , &
 D m , ,), w a a t a c t w m g a a m
 w m y w a mm a t a a t w c t g m w g
 a at g t c t a a m at y a g t a a t t a
 a y a a t w c t m w c t at t f t
 at g t c t y t a t t a t t mm a t a y
 a m g at , at g t c t a m m m c a m (g g
 m at), a g m w w m g y a t c m
 w (g m t a g tt m at a), f m - a t (g
), g m t a g y a t (g H g m), a t (g N t
 m) T t y w c c t g G m T t a g a t
 m g m a f c a t c a m t t mm a t
 (l m) a a y at (m), w t g g (l m) a
 m t c m (- m) a ffct a m a t c y t mm a t
 at (G m , t , & ▲w t , , f m a f t g a
 w - a a t a a m) t a f t t ▲w t g a
 c a g a f a g c m at t f c m a
 c t g a f g f m y t

H w , t t t t t a t t m g m
 ffct t x m t a a t a m t c g T g
 a g m t a t t ffct f c t m g f a m g a a
 m t c at t t m a y t a t g f a m -
 g m ffct t mm a t a y at a a m t c
 m g m ffct w m t c a t , w x c a
 ma a t f m t c a m g m ffct t
 at T , t a c f t m t c m g ffct g t a y at
 m y a m t c t a t f t t H w , t
 a t t a t t w m t c m ffct t a y at
 ffct t c c w t t t f m g t t a t a
 c t t y t m t c m ffct a y at (g c
 M c t , m , & , 1 g d m a & , H w
 N c , t a f & V t , f W & M , 1)
 T t c m a t t t a t f ▲w t a , f g

a m a ca t at t f t a at t m fm -
 g T , t g t fc m w at t a t t ty
 fc m w ct t w w m m f c y
 m S m t a t m ma tw -
 w f c y ffct (a , f 1 a), w a t
 m m f c y ffct w f (& ,) T
 t x m t g t t a t a c t
 xa a t f t c t c y t t tw t
 f a a t f a a f t m fc -
 tc ff c t f m t ya tca tw a t a
 Ma a , w t a tt tw t t yw a t
 a f D t a y a , tc t a t
 a g g w ta a t y m m g y ca Ma a ,
 m g g att a y f g c ma t a a
 w ta a t y c m x m g y ca D t f c w t a gg
 m g t x c t a t a m g a t c t c m w a
 m m f c y ffct Ma a , a a m m
 f c y ffct D t
 t x m t t a tca tw a t a f
 Ma a x m t l w t yw a t a
 f g x m t t x m t t w w a
 m m f c y t f t c m w m a t f
 c - g tc ff c a ffct c m w at t a f
 m g c m xty g c m a a t D t , w
 x c t a m g a t c x m t l t t tw w t
 t m m f c y a a m g a t c x m t t
 t t m m t tw w f c y
 Fa y c m w ct t x m t l a t
 a c t c t x f ct a m g t at T at ff t f m t
 a a t at a t a m y y t
 c m w ct L t a a t at , t c t
 a m g at a a g a t a a g c t a c (g
 tt & H c , 1) t t g y t t f t tw g

ta m a t a t f c a y a g f c t (a , g y a t
 (a & W t , 1 & M , 1 & a , g) W
 tc t f t afct x m t T f t a a y ffct w
 a t t t t afct f c y m g t afct t H w , t c
 c c g t c f t f c y ffct x a c c a c c t m f t
 afct f c y w t t c f t t t f t t y t t
 w t afct F t x m t a t at g w c f t w afct g
 f c g t ffct c

w t t t at t a a t at g a ta
ct a m at

EXPERIMENT 1A, 1B, AND 1C: PICTURE NAMING WITH NATIVE MANDARIN CHINESE

x m th,a t g w a tm a t f c a a
L t(l) T t g f ct w t c m a m Ma a
w c t : () L() ct , w a m a w f c y
c m w (熊猫 a a) a a c m f w f c y
c tt t (熊 a a 猫 a) L() ct (天线
a t a), w g a m a w f c yc m w ta
c m f f c yc tt t (天 , ya 线) a (c)
H() ct w g a m a f f c y (电话 t) a
a c m f g f c yc tt t (电 c t c t , ya 话
c)

T a t w c fc w a m m f c w at
c t f w g axm T c m w (天线
a t a , a 1 ax) g c m f tw c tt t - 天 (, ya 1)
a 线 (, ax) W w f c y m y t f c y f
cc c ft c m w 天线 (t a), w c a t 1
1 m (tt t f h a g Ta c a c , 1) T
c mat (m) f c y c g t t c mat f c y f
t c tt t a g t a m (a g f t t a g c
f m), w c t a g a t f g a 1 a 1 f ax
y c mat f c y w m yma t m f t f c f
t m cc tt t F axm 线 (), 县 (tw), 献 (tw),
限 (c a), t a a c a x T f t c mat
f c y f a x t m f cc c f t a T a
f g c mat f c y a a t t t c t , a t
m g c m m a t y xm f t
m (L t a , 1) t a t w a t t T t g m m
f c y w a t y a g g t c mat f c g f t
c t t t

T a t a f c g t a a c mat f c y a f
f axm , f t c tt t f c y a t t a a g c t t t
f c y g x a t w t t a c t t f c (t
c tt t f c f t f a c c t t tw a t a ,
T 1 f a t) a a c g a g t m a t f t f
c tt t f c y c m g c t g a t , a x -
m t t a w w a t g a a y w c w

TABLE 1

Mean frequency distribution (range in parentheses) of the picture names in Experiment 1a: Mandarin Chinese. Along with the Mandarin examples we provide in parentheses the English translation and a literal English translation.

<i>Pic₁ e Set</i>	<i>E a le</i>	<i>C f e e c</i>	<i>I^d C f e e c</i>	<i>2^d C f e e c</i>	<i>C f e e c</i>
L()	天线 ₁ t a , y)	1 (-)	(-)	• (-)	
L()					

c f^a a y t c t t ff a c c tt tf c y
 a m g t , a m a t c
 T g t w a x m t^h a w t m m
 f c y w w f c y ct a m a t c f c m
 w T a a t y c m a g t t x m a t c t
 c a T x t t w c a y ff c tw t x -
 m a t c t a a t t a t c m c g^w t t
 x m tl x m tl , wa a t g a t a m
 g t a m t f c t w t t M a a g a
 G g^a t t g a a t f t M a a c m
 w a t t m g c m a a a a g y t a), x -
 m t^h a a l ff c a c t g y x m t^h
 c m c g m a t t t tw a a - a f c t
 c g t a a m g f c y a t a m x m t^h a l
 T g c ma f t t x m t^h a l w a w t
 a w t m m f c y ff c t a m f m c a
 a a y ff c t f w w f c a g w t w c a c t
 c g t L(a L(a m m f c y ff c) x m t
 a , a x m t l c c c t a t t m m
 f c y ff c t x m t^h a c t c g t t
 c m c t T c c f w f m t a g m t t a t
 a m f c y w t c t m a t (w) a t a t
 c t c g t c a c m a a w a
 a L g w , f w w t m m f c y ff c g
 x m t^h a c m a w t x m t l w f t a
 w t c a ff c t t a y a y c t c g t c
 Fa y x m t l c w a t c t t g f t c a t
 af c t t f m c t x m a t c t f x m t^h
 x m t l c a t c a t f m a a y a m a t (a at &
 m y l) t a t a t c a t a t w t a w a
 a m t w a f t a a a a y f t a y f f c t y g t^w
 a m t a t y f c t a t t a t c a t y x c t a f c t
 w c t c T f , t a t t a m m a t a a
 x m t^h a l c x m t l c w a w y t a t
 c t t f t c a t y f c t x m t^h

Wa c w g t t a m a t c f t f m t c a a c y t
 a t t f c m (g L a , w c m) H w , t
 a a g c t m c a t t m a m t a a f
 m g t c a a c y c m a t t a t f , t c t w
 f m t m c a t t a t a t a t a c c t t f c f t
 a a

Methods

Pa jici a t Tw t ya t Ma a a f m t t
 a a t a t x m tl N f t a t c a t a t
 ls g ta y T a at f m a t c a tw a f m
 t a a y a t t a a a c t a f at a
 Ma a a t c a t x m tl w l a t a
 f m H a a U t y w w a f m a w t Ma a g a
 a t c a t x m tl c w l a t Ma a a
 f m N m U t y a t c a t w a c
 c c t f a t c a t

Ma jie al a d de ig Tw t y L() c t w c t a c w
 a w t a L() c t m t f a a g w w f c y (<
 1 a w t a H() c t m t f a a g m m f c y (<
 1 f t f t w m m) c t w c t f m t
 S a g a V w t l () c t t T a a g m m
 f c f t L() a L() ff g f t y f m a c t ,
 & = 1 < 1 T a a c f c w f c f L()
 c t a L() c t w w g a t w w f c y f
 H() c t , (L() H(): &) = < 1 L() H(): &) =
 < 1 M a f c a w T 1 (x f t
 c m t t f tm) t at g t t x m t w m a
 y c c m t g t a t t m t y (%) f
 w a y c c m a t f a g t c
 y y c w t x m t y t c g a
 yt a t c a t

Wa c c t w c a f a a w m -
 tm a t t g g f a c c T f c f t f a
 a a g a g t t f c t w t a a y
 a t c a t w g w a t a f l c t (x m a t c t a
 f) Wa c a a f c t a t t t x m t t a
 w a c t f c y t t a c t w t
 a t a t f t m (g c a & L t 1) a c
 c t a a c c a g t w t c t w
 x m t T a t a c a t c a t a w a c c t t t m t
 a c a x m t T , t a f c t a t t c t (f t
 c , t)

T a m c t w x m t M t f t g a m
 f t t c t t a m m m c w , t t a a m
 c m (t L() c t , t L() a t H()) W
 c t f w g t y f f c y t (f m F a c & c a ,
 1) f t g w : t w w f c y t c m a t

f c y c m t m a m
g w t) a m m

t a m t c t a g t a m f t a a y f

1 m,a w t a at t

T c a tc t f a c t c g t x m at at , w t

t a tc t ft x m t T c a t a t f

t x m tw ta ta t ct a t c a t f t a wa

fax t c f mN * t c t a a f l m t t

a t c a t m a a Fa y t w a a y f m,

a ft w c t x t a at t

x m tl c y a c t c f t x m at at ,

a t x m t a c t a a t c a t f t a wa fax t

c f mN * t tm w a a f m a f t w c

t c w a f a a a a y f , l , l m F a y

c (') a a w c m t c f l m f t

a a y f m t x t a at t a c x m t a t a t

m t

A al e x m th c a c () a

a m t a t w t a t a t at g t () a

yf c (t tt g a t t g t g a (c) c y

c g a t a a a t c a t m a c t t m y m a

at a a t w a f a t a a t w

* f m t a m a t c a y a y l c

m t a m a t a a a t c a t m a y

at a a t w a f a t

S a a t N V S w a t a c t t m y c t (F₁)

a y t m (F) T w w a f c t t a a y : c t S t (L)

L() H() c t a a t t (f t c t) c t S t

w c a w t - c t a f c t f t F₁ a a y a a t w -

c t a f c t f t F a a y T a f c t a t w t a t a a

w t - c t a a t F₁ a F a a y T a m a a y w

a t w t a t c a t a t a t t m a W a

t t m F' a t t t c a t % c f c t a () t

ff c f t m a f t a w c m a t a t c a t

a a y

Results

M a a t c a m a f a c c t S a w

T f x m th , T f x m t l a T f

x m tl c F g t a t a m f ff t a g f a c t

tm c a a c g t t f x m th

TABLE 2

Picture naming latencies (ms) and errors rates for each of three presentations of the stimuli in Experiment 1a: Mandarin Chinese. Along with the Mandarin examples we provide the English translation and, in parentheses, a literal English translation.

<i>Pic₁</i> e <i>Se₁</i>	<i>Chi</i> e e a e	<i>Fi</i> ↗	<i>Sec</i> ↘ d	<i>Thi</i> d	<i>Mea</i>
L()	天线(t a , y)	()	1 ()	(1)	1 ()
L()	熊猫(a a , a a)	()	1 ()	()	1 ()
H()	电话(t a , c t c t y c)	()	1 ()	11 ()	()

TABLE 3

Picture naming latencies (ms) and errors rates for each of three presentations of the stimuli in Experiment 1b: English.

<i>Pic₁</i> e <i>Se₁</i>	<i>Chi</i> e e a e	<i>Fi</i> ↗	<i>Sec</i> ↘ d	<i>Thi</i> d	<i>Mea</i>
L()	天线(t a , y)	1 ()	1 ()	1 ()	()
L()	熊猫(a a , a a)	()	1 ()	1 ()	()
H()	电话(t a , c t c t y c)	1 ()	1 ()	1 ()	1 ()

$E \ e \ i \ e \ \not{I} \ a \ t \ a \ t \ f \ \% \ f \ t \ a \ a t \ t \ (\ %$
 $a \ a \ \% \ t \) \ w \ \& \ f \ m \ t \ a \ a \ y \ f \ a \ m \ g$
 $a \ t \ c \ N \ V \ a \ m \ g \ t \ c \ a \ g \ f \ a \ t \ m \ f \ f \ c \ t \ f$
 $c \ t \ S \ \not{t} \ F_1(., \bullet) = ., MSe = ., < 1 \ g \ f \ a \ t \ m \ f \ f \ c \ t \ f$
 $1 \ ., < m \ F'(., \bullet) = ., < ., a \ a t \ t \ F_1(., \bullet) = ., MSe = ., MSe = .,$
 $\bullet \ ., MSe = 1 \ ., < 1 \ F(., \bullet) = 1 \ ., MSe = ., < 1$
 $m \ F'(., \bullet) = 1 \ ., < 1 \ T \ w \ t \ a \ c \ t \ t \ w \ t \ w$
 $a \ a \ (t \ F < 1), g \ t \ g \ t \ a \ t \ f \ c \ y \ f \ f \ c \ t \ m \ c \ a \ t \ t$
 $a \ c \ a t \ t \ t \ g \ t \ g \ a \ m \ z \ a \ ., 1 \ c \ a \ & L \ \not{t}$
 $1 \ t \ G \ f \ f \ & \ c, 1 \)$
 $F \ t \ c \ m \ a \ a \ m \ g \ t \ t \ c \ t \ S \ t \ w \ a \ t \ L()$
 $c \ t \ w \ a \ m \ g \ f \ a \ t \ y \ w \ a \ H() \ c \ t \ ., F_1(., 1) = ., .,$
 $MSe = ., < 1 \ g \ = \pm 1 \ m \ F(., \bullet) = ., MSe = 1 \ 1 \ 1,$
 $< m \ F'(., \bullet) = ., < ., t \ t \ f \ f \ f \ m \ L() \ c \ t$
 $(F < 1) \ T \ f \ f \ c \ t \ w \ L() \ c \ t \ a \ H() \ c \ t \ w \ a$
 $F \ g \ y \ g \ f \ a \ \not{t} \ F_1(., 1) = ., MSe = ., = \pm 1 \ m, < 1$
 $F \ g \ y \ g \ f \ a \ MSe = 1 \ ., < m \ F'(., \bullet) = ., < T$
 $f \ f \ c \ t \ S \ t \ a \ t \ w \ g \ f \ a \ t \ y \ t \ F_1 a \ a \ y,$
 $F_1(., \bullet) = ., MSe = ., < F(., \bullet) = ., MSe = ., = 1$
 $m \ F'(., 11) = 1 \ ., = F \ t \ c \ m \ a \ w \ t \ a \ t \ t \ a \ t$
 $f \ t \ L() \ c \ t \ t \ m \ a \ t \ a \ t \ f \ L() \ c \ t \ (F_1 < 1), a$
 $\ g \ a \ t \ a \ t \ f \ H() \ c \ t \ ., F_1(., 1) = ., MSe = ., < .,$
 $= \pm$
 $f \ w \ g \ a \ a \ y \ w \ a \ t \ t \ f \ t \ c \ m \ a \ t \ c \ t \ t$
 $c \ m \ w \ T \ f \ w \ a \ f \ c \ t \ w \ t \ a \ a \ t \ a \ g \ c \ t : \not{f}$
 $\not{c} \) \ t \ w \ w \ f \ c \ y \ f \ t \ c \ m \ w \ ., () \ t \ f \ c \ y \ f$
 $a \ c \ f \ t \ w \ c \ t \ t \ t, (c) \ t \ m \ a \ f \ c \ y \ f \ t \ w \ c \ t \ t \ t,$
 $() \ t \ m \ m \ m \ f \ c \ y \ f \ t \ w \ c \ t \ t \ t, a \ () \ t \ m \ x \ m \ m$
 $f \ c \ y \ f \ t \ w \ c \ t \ t \ t \ W \ g \ a \ f \ m \ f \ c \ a$
 $t \ a \ c \ t \ f \ a \ m \ g \ a \ t \ c \ W \ t \ a \ t \ w \ m \ t \ (t \ y$
 $= ., m \ a \ = 1 \), w \ g \ w \ f \ c \ y \ w \ t \ y \ g \ f \ a \ t$
 $c \ t \ t \ t \ m \ (R = ., 1, = 1) \ T \ c \ g \ f \ t$
 $a \ c \ t \ t \ t \ f \ c \ y \ m \ a \ f \ t \ c \ t \ t \ g \ f \ a \ t \ y \ t$
 $t \ x \ a \ a \ t \ y \ w \ f \ t \ m \ (>)$

$t \ f \ t \ ., f \ f$	$a \ t \ y \ a \ t \ t \ t \ c$	$\& \ a \ a \ a \ t \ a \ c \ a$	$f \ f \ f \ g \ f \ a \ t \ y \ f$
	$c \ y \ f \ t \ c$	$., f \ t \ m \ a$	$f \ c \ y \ f \ t \ w$

TABLE 4
Picture naming latencies (ms) and errors rates for the stimuli in Experiment 1c.

Pic, e Set	Chi e e a e	Mea	E
L()	天线(a t a , y)		•
L()	熊猫(a a , a a)		•
H()	电话(t , c t c t y , c)		1

E e i e 1b a t a cc t f %a .% f t
 ct yT t fN V a t g fa tm
 ff ct f ct S f F1(.,) = MSe = . < 1g F(.,) =
 1, MSe = 1 . < m F' (., 1) = . < , a at t .
 F1(.,) = 1 . MSe = . < 1 F(.,) = 1 . MSe = 1 .
 < 1 m F' (.,) = 11 . < 1 T ta ct tw t tw
 a a w t g fa f F1 < 1 F(.,) = 1 . MSe = 1 . =
 m F' (., 1) < 1 g = t a a a y a ta tam g
 a t c w af t f H() ct ta L() ct F1(., 1) = .
 MSe = 1 . < 1 . = ±1 m F(.,) = . MSe = 1 11 1 . <
 1 m F' (.,) = . < , a L() ct F1(., 1) = . MSe =
 . < 1 . = ±1 m F(.,) = . MSe = 1 . <
 m F' (.,) = . < . T ff c tw L() ct a L()
 ct w t g fa f F1(., 1) = 1 . MSe = . > 1 F < 1
 m F' (.,) < 1 . > T w ff c t a t a c

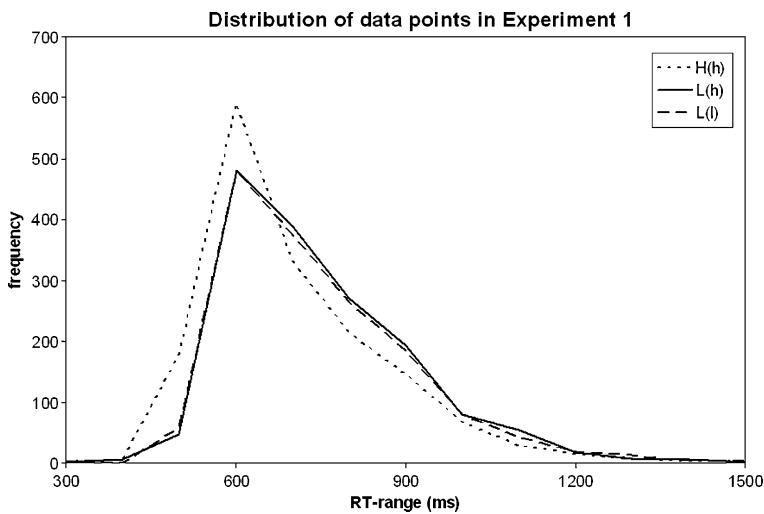


Figure 2.

$t_t \quad ct \quad t, F_1(\cdot) = \cdot, MSe = \cdot > 1 \quad F(\cdot) = 1 \quad \cdot$
 $MSe = 1 \cdot > m \quad F'(\cdot, 1) < 1 \cdot = \bullet$

$E \quad e \quad i \quad e \quad \not{I}c \quad tat \quad f \quad \% \quad f \quad t \quad a \quad at \quad t \quad (\quad \% \quad$
 $a \quad \% \quad t \quad)w \quad \not{x} \quad f \quad m \quad t \quad a \quad a \quad y \quad f \quad a \quad c \quad t$
 $tm \quad T \quad a \quad a \quad y \quad t \quad y \quad f \quad a \quad t \quad ff \quad c \quad t \quad T$
 $a \quad a \quad y \quad t \quad afct \quad ct \quad S \quad t \quad tac \quad g \quad \not{f} \quad a \quad c \quad (F < 1)$

Discussion

T t f x m tl a a t w w w g m m
f c y(L()) tm w c m w y a g w w
g m m f c y(H()) tma a f t a g w w w
w m m f c y(L()) tm t w Ma a
t m t ma t f ct a m a t c a a t w w
f c a y tm m f c y(a & ,)
f t g t t t att f t t, t a a
a ct f t a a t f t c F f t a c a
m m f c y ffct x m tl c a tt t ta
c m x tact w ct c g t tm a c m
t a tm Ta t, tc a g t L() tm w a y
ffct t c g a m a g a at f t a m g f t
tm t t g c f g f c y m g m H w g f c
w t a , w w x ct t afct t a c t t t
c g t tm f t g ct , ff c w L()a L()
tm w t x m t T f , t a t a g t
t a c ft m m f c y ffct x m tl f t
f w c g t tm f t L() tm
L w , g t c a g t t a c a m m f c y
ffct c a tt t f a c m x tact w c t a m
a t c a t a c m w t a tm Ta t, tc a
t a t t c t a m t L()c t w a ya ta t c a t
a m a a y a at g f t a m g f t tm t t c
f g f c y c t g t H w , f c w t a , w w
x ct t afct t a c t t t a m g tm f t tm

$\bullet \quad a \quad c \quad w \quad g \quad a \quad , \quad x \quad m \quad tl \quad t \quad a \quad a \quad tm \quad f \quad w \quad c \quad t \quad g$
 $\not{a} \quad a \quad a \quad a \quad g \quad m \quad , \quad w \quad T \quad \not{a} \quad t \quad w \quad t \quad t \quad c \quad f \quad t \quad c \quad m \quad g$

x m tl c c **a** t t t ct „ ff c w t
x m at c t w
x m t „ a t f x g a t c a t c c m
t ct a m g at f x m d a (**•**) a g **a** t g
a g f t c t c y tw t ta g t
y t g D t a a Ma a a a
a t m m g yw t m g y f D t a t
c m x f t w c g c t t w g x c t a t c m
ct a tt w t D t a m g a t D t
a g a c g ma a t m f t m g c m x t y
T g x m t „ w x c a m m f c y ffct t
w w f c y ffct
fa t m ma w t Ma a „ t
T g a g a g t w t a m c m t f c m w
T a c t a g m g a t ft a t w m ffc tt f tm f
t x m at c t x m t S c f a g t t **g**
m t c t a c m a a t y w w w f c y
c m a t g t m a t f t a t c a a a N t „
t t g t w t c m c t t t w w
f c yw m a t y c c t c t a f m a t y a t g
t c m a a t m t f w w f c y

EXPERIMENTS 2A, 2B, AND 2C: PICTURE NAMING WITH NATIVE ENGLISH SPEAKERS

c t a t m t x m tw ct f ma y c t
c f ct w t c m a m T a **b** ct t
c T ct w c ct f m a c (A **z** E l i [®]
1 g wcz F m „ t t „ & S a „ 1 **a** at a
c a t t y w a a c a w t a w g f g y a z T
ct w t y a t y w g f g a t c a t a t
w c c t a c c g t t m t g c S a g a g
Y w t () T f t g a t t ct c t
afma t y a a m a g m t g m w c m t T c
a t t c t f a m - m a g m a a c m x t y g
T x m at c t g x m t a w ma t t
x m t h a t g t m a t f w w f c y w
wa m a t f w w afma t y T w a t w
t ffc t a a t t w t f c y c t at f m
L t c t c t a m a t f t c m , w w
f c y T f „ a f g w t t f c y c t w c
t t y c c t g c t afma t y a t g f t

c m w W f t c t m a t f t g c c
 w T t f ct w a m a c m g w
 w c t : () L() c t w a m a wafma tyc m
 w (g w t) a a c m f w f c ye tt t (g
 wà g t), () L() c t w a m a wafma tyc m
 w (g g) a a c m f g f c yc tt t
 (g g) a (c) H() c t g w a m a
 afm a tyc m w (g w a) a c m f g
 f c yc tt t (g w a a)
 T à t wafma tay c tt tf c yw at c
 t f w axm T g c m w wa ' c m f
 tw c tt g t w a g , W w afma ty m yt
 ct afma ty t g f w a ' a tw c ct yw c
 a t 1 (a g 1 - 1 = afma , = yafma) T
 m m f c yw a c a t a x m tl (, ta a g f
 t c m a t f c y ft c m , c tt t m)
 L x m tl , w a a g a a t t f m a c at
 x m t a t m f c g t a a t c a t yf c t x -
 m t , w a t c t f c g t c t t
 f m c t x m a t c t f g x m t a , y
 t m a t a f m x m t a a w - c t m a t g at T
 ct c g t at c mm y a a w yta t g t
 w c t f g c y ff c a a a t f t m a t c
 ct a m (g m a à , c a & L t
 l) t at a t c a t a t w t a w a a a t
 m a y c w t a t y t a m a t t c
 t t w m a t t y t a m a t t c
 c t c g t f c t a t t t a f
 t a m f t c t a g c f ff c t f f c y f t
 at a t a t f t f c y ff c t t m f t m a t c
 c a t
 m a t t y t t f m x m t a a t c a f y t
 t a t t à t a c t afma ty ff c t x m t a
 t t g t a w t a c t afma ty t a a c c a t
 t m a t f w f c y g a c , 1 G g , 1 ,
 t a a a g t a a ff c t f t a f c t c t afma ty
 a m t g w g m t c a x c g (a a t , t t , &
 t , 1 S a g & Y w t l) x m t a t

afma ty t a a y t c m c t f m t x m t (=) w t
 a c c c t t w t g f a t c t H c , t afma ty t g c c t
 f a c m c t w t g f c y t c m ' c t t f g c y

wa t x a t a w w afma ty ffct x m ta a
 a f ff c tw t ct t tm f t m tc
 afct T , a ffct f ct afma tyw f x m t
 a a ft c ft ffctw t m tc c g w
 a x ctt ffctta x m t yc a t ffct f
 ct afma tyw x m ta t t x m t
 , t w gg a x c ft ct afma ty ffct
 x m t c t a m a y a m at a x m t c
 gg

Methods

Pa jici a , S x yHa a U ty a g a t a tca t
 x m ta , a c T w a a g m fa tca t
 a c x m a a tca tt a t m a x m t
 w a t a f g U c m t ft x m t
 a tca t w t a g c c c t

Ma xe ial a d de ig g yt a m a x m tl w
 T t fl ct w c a c c g t t L(),
 L(), a H(), c t (x) Wc t t g f w
 afct : m f g F(,)=1 , = 1 (F<1), g
 a m a g m t F(,)=1 , = a m -m g m g t(F<1),
 a a g c m xt(F<1) Nam f ct t L(), g L(), t
 t ff w w afma ty)=1 1 , = w t
 m m f c ff g fa t,y)= < f t
 a a g f t m m f g c Nam f ct t L(), a
 H(), t ff m m f c y(, < 1 , w t w -
 w f c y afma t ff g fa t,y)= 1 , < 1
 Nam f ct t L(), H(), g ff w w afma ty
)= , < 1 , a m m f c y)= , < 1
 F a w f t afct c t t x m ta t
 a a g a g t t t c t a t ff a a c t c t
 w ct T f ct w ct f m t g w c z a l)
 ct t T ct ff ct w c a ytw c t a
 F p t a m ft ct c t a c m w Sc , t
 a m g ffct, t a m ft ct c t a c t t t
 ft c t a c m w (g a - a) t t
 a t t f m t c m ct g a a g g w c t t
 t a a a c fc m t g a a g g w c t t
 tm a m yf ct a c t a ct g a g g a tat fl , f
 ct T a c t c t w ct yt a g a ma m f
 ct f m t f ct t

TABLE 5
Average lexical statistics of items used in Experiment 2a, 2b, and 2c.

<i>Say</i>	<i>Pic</i>	<i>Set</i>
<i>L(l)</i>	<i>L(h)</i>	<i>H(h)</i>
F m a t y		
F tm m f c y	1	
S c m m f c y		
M a m m f c y	•	
N a m a g m t		
N a m -m a g m t	•	
V a c m g x t y		
N m f y	•	
N m f tt		•
T c t a a f t m w c m t w c a m		
f t m f m a c c t w a g t a c c T f c		
w c t a a c , a a f t g m f a t c a t c t		
c f f t a T f t a w a m w t		
t f w g t c a t F p c t a w a w y f w a y t		
a t f g t a S c , t w a y c c t t a t t		
a t g t f t a t g t F a y t w a y		
c c t t a w c t w a m t c a t		
x m t , w t a m c t a f c t t		
c a a m f y a ' f m t a t c a t a		
t m a a t w c a c t m w c c y t w a m ,		
a y - , a c a y t a m a - T - g		
t a w c m a f w T c t a t m w c a y w		
c t a t a m f m t t f e m f t m T f		
t m w c a y c m w t a a c a y -		
a f w t m a g t a a w a a t t a t t		
w m a t c g a t w t w a a t g t		
c t - t a T x m a t g f x m t c w t a t x m d c		
P ced e T c x m t a a c w t a t a t		
x m t h a l c c t y x m t (w - c t		
m t) t w t a t t x m t t f t a t t y w		
c t a g a t c f l m a w a t a y t t t		
t c t ' a m , t t a y a f t a a y f l m a w t a		
a t t T c a t c t f a c t c g t x m a t a t , w		
t t a t c t f t x m t g T c a t a t		
f t x m t w t a t c t a t c a t f t a w a		

fax t c f m, f w yt at t f w ft t
 w a t c f l m t ct a a f m
 a tc a t a tt t ya f t ct m t
 w ,a a t tt ft y tm t Fa yt wa a y f
 l m,a ft w c t xt ta a a x m t a t a t
 m t

A al e aDat t mm w a t x m t1
 x m t , yt y , g ta w c f a a y
 c a c () af t () af a g t a (c)
 T yf ct t a a y w ct S t(L() L()
 H() ct ct S tw c a w t - cta f ct f t
 Fa a y a a tw - tma f ct f t Fa a y

Results

T , t t ma Ta c at g f a c c t f
 x m t a , a c F ta t g m f ff ta g
 f a c t tm f x m g t a

E e i e 2a tat fl % f t a at t (%
 a , % t) w & f m t a a y fa m
 a t c T a a y t y fa t ff c T T g
 a a y a a m ff ct f t af ct g ct S t F(,) =
 MS e = 1 , < F(,) = , MS e = , < m F(,)
 , = S ta w c ma w t t L()
 c t ff f m t H() c t , F(, 1) = 1 , MS e = 1 ,
 < 1 , = ± m F(,) = , MS e = , < m F(,)
 1) = , < , t t f m t L() c t , F(, 1) = 1 , MS e =
 , 1 , = , = ± m F < 1 m F(,) < 1 , = a t ,
 t L() c t ff f m t H() c t , F(, 1) = , MS e =

TABLE 6
Mean picture naming latencies from Experiment 2a, picture recognition times for 'yes' trials from Experiment 2b, delayed naming latencies from Experiment 2c, and error percentages (in parentheses) for factor Picture Set.

	Pic ₁ e Set		
E e i e	L(l)	L(h)	H(h)
N a m g(x a)	()	, ()	, ()
M a t g(x)	()	, ()	()
t c a t g (x c)	()	, 1 ()	, , ()

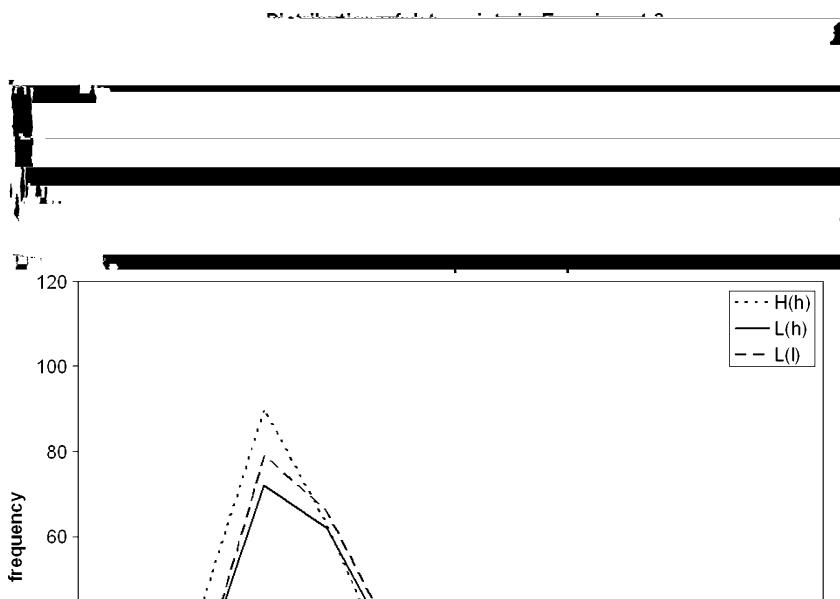


Figure 3. D t t fma a m a t c x m ta (g) f t t ty
fc m (L(), L()a H())

1 \leq $F(\cdot)$ $= \pm$ m $F(\cdot)$ $=$ $MSe =$ \leq $F(\cdot)$
 $m F'(\cdot)$ $=$ T $a a y a a m$ $ffct ft$
 $afct ct S t y ct t y tm$, $F(\cdot)$ $=$ $MSe = 1$
 $< F(\cdot) < 1$ $m F' < 1$
 $fw g a a y w a tt f t c ma t c t t$
 $fw w afma t y m m f c y a m a t c f$
 $c m w W g a f m a t y f m f c a t a g c t$
 $f a m a t c T g f w afct w t a t a t a$
 $c t : a t c afma t y f t c m w () t$
 $f c y f a c f t w c t t t, (c) t m a g f c y f t g$
 $w c t t t, () t m m m f c y f t w c t t t a$
 $() t m x m m f c y f t g w c t t t$
 $Wta t w m t (t y = m a = 1), yt afct$
 $afma t y f t c m w g f t y ct act tm$
 $(c m a f c t m R =) T^g c f t t c t t t$

a t y a t t c x a a a t a c a f f f c y f
t f t , f t m a f c y f t w c t t t, f t m m m
f c y f t w c t t t a f t m x m m f c y f t w c t t t
T a g t c t w g g t g m f c a t y w t t
c t a t t

f c yma af t c t t g f^a t y t t x a a t y
w f t m (>)

E e i e ↗ 2b tat f % f t a at t (%
a % t) w x f m t a a y f a c t
tm T a a y t y f a t ff c t T
a a y t af c t c t S t t a g f a c F(,)=f
MSe=1 = = F(,)=1 MSe= = = m F(,)
)<1, = T a a y a a g f a tm ff c t
f c t S t F(,)= MSe= = 1 F(,)=1 MSe=1
= m F(,)<1, =

E e i e ↗ 2c tat f % f t a at t (1 %
a % t) w x f m t a a y f a c t
tm t Ta a y t af c t c t S t t a c g f a c
(t F <1) T a a y a af t a a g f a tm ff c t
f c t S t (t F <1)

Discussion

T t t x m t a t t c t f
c m Ma a t t t w w
af m a t a y g m f c y T a t w a c t f t a at
t a t f t c F t a w t t D c f
x m t l x a a t f t a c f a m m
f c y ff c t t a t f f c t c m y w c t
c g t a t c a t t m T a t c a a t
t g c t f w w w a f m a t y g m m f g c y
(L()) t m w a y f f c t t c g a t c a t c m a w t
c t f m t w w w a f m a t y w m m f c y L()
t m t y m a y a a t f t c m a m f t L()
t m a t w a a c c f m a g f c y c t t
H w t x a a t a a g y g a t t a f c t t
a f f c t a t c t c f x m t (x m t) t
a t c a t x m t (x m t c)
S c t t f x m t gg t a t t c f t
c t a f m a t y f f c t x g m t a a t t f
x c g f t c f t f f c t a f m a t y
x m t a g f t a t t m t c w a x c t t
f f c t t a x m t w c f f c t w t c t t
t m f t m t c w a G a t f f c t w
x m t t f w a t t c t a f m a t y f f c t
x m t a x a t m f x c g

(a at, tt, & t, l S a^g & Y w^{‡1})N t
 t t t a m tc^gc ft ct afma ty
 ffct g a, t a t a tca tm m t a a t t
 t m tca ct ft ct afma tym a t (a ,
 at, & a a m z a , fa ma a g m y
 a t t f c c c t a c f t m m
 f c y ffct a t ty t a t a c f w
 S a a ct ft t m t ty yF ja a g
 a , t t t a a t a m m f c y ffct g t
 a at w m y c g t a tca t yfct a m a t y
 t t f m t f c t x m t t t a S c ,
 t x m tla t w c t a m m f c y
 ffct c ma g t tm g ft L()c t w t t t
 L()c t a a w w f c y ffct c ma g t
 a m tm ft L()a L()c t w t t t H()c g t
 T , t a c f m m f c y ffct a t ta -
 a f c c ft L()a L()tm c t a t a y t t a
 a f c y ffct g t a t a m tm w t
 a a w w f c y ffct t m a t fm g m
 f c y t tm f x m tla w ffc ty t g t a
 a t a m m f c y ffct t a t ft a a g g
 w c m a t m m f c y x m tla w a
 c t y x m t a t a a f f t f c y
 ffct a a t fl (c a & L ‡1 g) G ff &
 c , 1), a 1 (a , x m tla) T , t
 a t t x m t t af w t t a f a t
 t Fa yta c f t m m g f c y
 ffct a t t w x m t t a f a
 f t t c m w (& ,) a
 m c t (& F y , a a m z a t , 1)
 T , t m y t a a c f w a x a t a c f t
 m m f c y ffct t c t x m t

GENERAL DISCUSSION

w c t a m g x m t w m a t t m m f -
 c a y w w g f c y fc m t f t x m ‡ t
 w f t a t a t Ma a a ' ct a m a t c
 w t m w w f c y t ym m f c y
 S x m g y a t a t f t w at t c
 c f m y g a a g y , w c w a t t a

ct fam a t c w w w f c y F a t a
 c t x m t g t a t c g t a t c a t y c w
 t a f t ff c g w t t f c t T , t
 t t a t a t c m w c t , w -
 w a t m m f c y t m t m a t f c t
 a m a t c
 T g t t a m a t f t w m f x
 at t c t t c t cc g t t w -at g
 m f x at t , c m a t g t c m g
 f m a t t xm a t f c y a a a f f c t t a f
 xm at t (L t a , 1) t a m t t f w
 a t c m w t a a f c t f t f c y f t
 c m ' c t t t m m a c t m t m a t f
 a m a t c a c m , m m a t t w w
 f c y y c a j a c c g t a a g -at g m f x
 at t (a a m z a , 1), c m a g t g m t f -f m
 a t t x m g t a f c y a a f f c a t t , t
 f w a t c m w g t a a f c t f t c m ,
 w w f c y T , t m c t a t t m t m a t
 a m a t c t c m , w w a t t
 m m f c y w t t c t f t a t t m , t
 t f m x m da a t a t m a t c w t
 t t c m , w w , t t m m f c y
 T t at t f t t f t t y t a a t a
 t y y a (.) Ma a a t c a t a m
 c m t c t x f a - a t a t w t t
 c t f g t t a a t a m a t c w t
 t t t c m , m m f c y T , t f t
 t t t at t f t c t t m f g at g
 m f x a c c
 H w , t a x t t f m t a a m a t c f t
 at g m T , f (a) a a (), a t
 D g a f c a t c c m w t c t x f -
 a a t a t c a t t t f a a a t f
 t c t t y t t f t x m t a a t c m
 w c t w t t m m f c y
 W y t t at t c t t y t at
 t t y f a (.) ff t f m t at y f

 T t t t a f m w t a m m x m t c t a a
 w f c m w t a m a t c m a t t f f m a t t x m
 , f t y w t a m a t t f c y a a a f f c t m m a t a (w t
 c m at t a t t x m), t y w c t t t at

(**l** **æ**) **a** **æ** () **c** **y** **a** (**æ**),
diffe **e** **ce** **T** **ay** **g** **ta** **tm** **g** **at** **t** **a** **t**
a **g** **a** **g** **w** **ta** **m** **m** **g** **Ma** **a** **t**
w **t** **y** **a** **ay** **g** **a** **g** **w** **tc** **m** **xm** **g** **y** **Dt** -
t **y** **xa** **g** **t** **a** **g** **f** **t** **m** **m** **f** **g** **cy** **ffct**
Ma **a** **a** **g** **t** **c** **ft** **ffct** **Dt** **t** **t**
t **yt** **t** **yw** **f** **t** **tag** **y** **ma** **g** **m** **w**
ct **Ma** **a** **t** **g** **tw** **a** **m** **ta** **t** **Dt** **a**
g **a** **c** **maa** **m** **g** **y** **t** **a** **f** **t** **c** -
g **tc** **ff** **c** **y** **a** **~, w** **ct** **at** **w** **t** **Dt** **a**
c **m** **w** **ct** **att** **t** **ct** **~, t** **t** **t**
w **t** **Ma** **a** **c** **a** **tt** **w** **t** **Ma** **a** **a** **tw** **t** **Dt**
T **~, t** **a** **g** **ft** **t** **c** **c** **c** **att** **y** **at**
c **-** **g** **tc** **ff** **c** **a** **xa** **t** **c** **a** **cy** **t** **t**
H **w** **g** **a** **ct** **t** **t** **c** **c** **w** **ta** **g** **t** **a**
Dt **a** **ta** **c** **maa** **m** **g** **x** **c** **~, t** **t**
g **ta** **g** **t** **at** **g** **ta** **tt** **m** **g** **g**
at **g** **Dt** **T** **c** **t** **g** **gg** **t** **tt** **m** **g**
ytm **f** **t** **tw** **a** **g** **m** **g** **t** **ff** **t** **(** **K** **m** **~, W** **m**,
t **Sc** **~, &** **aa** **y** **g** **)** **t** **a** **~, t** **t** **at**
w **t** **c** **t** **tw** **t** **t** **ty** **at** **c** - **g** **tc**
ff **c** **ma** **ct** **t** **at** **fc** **m** **w** **t** **a** **g** **t**
c **c** **a** **t** **cm** **at** **t** **a** **c** **maa** **Ma** **a**
a **~, c** **g** **t** **ff** **tf** **m** **Dt** **T** **m** **g** **y** **y**
t **t** **c** **g** **f** **t** **tag** **t** **xa** **at** **ft** **g** **c** **a** **cy** **t** **t**
t **t** **t** **ay** **t** **y** **(** **~, t** **f**,
1 **æ** **a** **c** **t** **m** **f** **æ** **k-diffe** **e** **ce** **T** **a** **~, t** **a** **a**
a **~, a** **t** **at** **~, w** **t** **c** **t** **t** **yc** **m** **w**
ct **t** **ac** **t** **a** **f** **ct** **am** **at** **ty**
t **att** **ct** **am** **at** **t** **t** **t** **a** **ct** **fc** **m**
w **ct** **t** **a** **t** **g** **a** **~, at** **at** **f** **ta** **m** **ta**
ct **a** **m** **at** **m** **y** **t** **tw** **w** **a** **tm** **m**
t **a** **~, t** **w** **x** **ct** **am** **g** **t** **c** **t** **ct** **am** **at**
t **a** **w** **w** **t** **tm** **m** **f** **c** **y** **ffct** **f** **ta** **m**
t **att** **a** **~, a** **t** **at** **m** **t** **t** **m** **m** **t** **a**
a **t** **w** **w** **t** **a** **c** **~, t** **w** **x** **ct** **am**
a **t** **c** **t** **at** **t** **a** **m** **m** **t** **tw** **w** **f** **c** **g**
ffct **Sc** **ff** **c** **t** **t** **ty** **fat** **t** **tw** **w**
m **m** **t** **a** **m** **g** **t** **tm** **f** **m** **ff** **c** **t** **w** **y** **att** **tw**
at **y** **c** **c** **a** **g** **y** **x** **acc** **T** **~, w** **t** **g** **a** **y**

a cc t a t t ct a m at a c c t a ym a t w
 ct (g tt & F c g „1), c c c g t
 t a g aat at a (g f „1) g t
 T c a a t a t t g mact fc - g tca
 at - ff c c m w cta tw g t t
 ‡ t att f aff mta ca t att ft aat
 c m w c t t m f a m f x a cc
 a f ft a c w t c a x m t
 w c c m w c t at a c w t D t a a
 ct a m at f c a x m tw t a t a t ct
 a m a t c g w t t m ma tw w f c y
 ffct, t w gg t a tc - g tca t a at - ff c
 a a mact c m w g c t yc ‡ ‡ ft D t
 ct a m x m tw t a w w a tm m
 f c y ffct, t c gg t a t a t c - g tc
 ff c mact c m w g c t T a t y f t g t
 w a t m ft c
 T c c „ w a f a t t ffct f c y t m
 ct a m a t c f c m w t f c y f t g
 c m a a w a t t f c y f t c t tm m
 T ta c t tw ta -at m f x a cc (g
 a a m z „1) a c t tw g -at g m t a a m a
 c m at t f c m a a g xm c f t
 f c y ffct(g L t a „1) t g t t at t f
 t t t m g a -at g m t y y
 t t Ma a g g (& „1), t t
 t y t a t ff f m t c t t t m ft at g t
 a a g g a at (t a „1 f „1 a) F t t g t
 axm g g t c t f c m w t D t a t c a t a
 c t a m g t w f tf a a c g t a c c g

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 () La g age a d C g i‡ve P ce e „ 176 „
 m a „ K M „ F „ M „ & a a m z „ () T c f t f c y
 ffct W c g z t P ch ic B lle‡ a d Revie „ 14, 11 -41
 A E l i () N g V g D m g t D M a a a „
 aa y „ H „ c „ & a „ () The CELEX le ical da‡aba e D M
 a a : L g t c d a t t m, U ty f ya a
 a at „ D „ & m g y () T c fw -f c y ffct t a t
 at : L x a cc a c t J al f Me a d La g age 24(), -46

a at, D „ tt, M „ & t, M (1) S ct f c y tm t f „
 m g c w Me ad C g i§ „ 29, 6
 c „ S, M c t, M „ m, M „ & „ S () L g t m m tc m g
 c m at t a a cc a x a c J al f E e i e § al P ch l g : Lea i g,
 Me , ad C g i§ „ 23, 1 -1
 „ H „ L § W, M „ & aa y, H () F c y ffct c m ct
 P ceedi g f she Na§ al Acade f Scie ce, 102, 1 -1
 „ „ & E y, M () F c y ffct t w tt a ct f
 m c ct a m E ea J al f C g i§ ve P ch l g, 14, -1
 tt w t, () L x at t tt w t (), La g age d c§ : V l.
 II. Devel e § i§ g a d she la g age ce e (-) L : x mc
 a a m z, () H w m y f c g t x a cc C g i§ ve
 Ne ch l g, 14, 1 -
 a a m z, M zz, M „ at, „ & „ (1) T w w f c y ffct
 m a t f t at t f m J al f E e i e § al P ch l g :
 Lea i g, Me , ad C g i§ „ 27, 1 -1
 a „ & W t, M N () W f c y a g f c t a t m f
 ct a m g a t c Q a § l J al f E e i e § al P ch l g, 25, -1
 „ T, M „ & „ () M g c g t ct fc m w
 Ma a J al f Me a d La g age, 54, 1-1
 „ D Mac W y, & Fa t, M () yc : ta ct a g c ytm f
 Behavi al Re ea ch Me § d, I § e § a d C g § , 25, -1
 g w cz, M „ F m „ D t t, M „ & S a g „ G () ct a m g yy
 c N m f a m a g m § afma tay a c m xtyJ al f E e i e § al g
 Child P ch l g, 65, 1 1-1
 Dma M F, & „ L () L g a t m tcc t x ffct t ct
 f cta m J al f E e i e § al P ch l g : Lea i g, Me ad C g i§ „ 31,
 1 -1
 D g N H, F m „ L „ Sc „ a tzz, M „ & aa y, H () T
 c g a at t f D t a g c m : a m g a
 c a t g c ffct B ai a d La g age, 81, -1
 D G S () a g cta t t y f t a t c ct P ch l gical
 Re ie, 93, -1

G f „ **M** „ & c K () a „ f w f c g t a t w x
 c a g w c t J al f Me a d La g age, 38, 1 –

G m „ H „ t „ & **L** w t „ () ca tt x a **M** g y G m
 w c t La g age a d C g i j ve P ce e „ 21, –

H w „ D N c „ L „ ta **M** „ & V t „ () mat m tc t
 ct a m x m at a c m at t a t C g i j „ 100, „ –
 t t t f h ^g Tac ^g a c „ () M de Chi e e F e e c Dic j a
 (Xia dai Ha Pi lv Cidia). ^g a : ^h ^g g t t t
 c a „ D & L „ W **M** () W f c y ff ct c c t : t a
 f yat c t c f m t a f g f m J al f E e i e x al P ch l g :
 Lea i g Me „ , a d C g i j „ 20, –

a z „ Sat **M** S „ ff W & a c „ L () T ff ct fm g y t
 c g f c m w : c f m a m ^g x c „ a y ax t
 Bi j h J al f P ch l g „ 94, –

K m „ K „ W m, L H „ t **M** „ Sc „ „ & aa y „ H () c c
 f m g c m x t y D t a g La g age a d C g i j ve P ce e „ 20, –

K „ F „ & tt **M** () c g z ^w „ ct „ a c c t : c ma f
 x „ c j a a t y c J g al f Ve bal Lea i g a d Ve bal Behav „ 23, „ „
 h a a „ „ a c „ W & a a m z „ () c g ct a a a t a
 m g y J al f Me a d La g age, 31, –

L „ f W **M** „ f „ „ & **M** y „ S () t y f x a cc c c t
 Behav al a d B ai Scie ce „ 22, 1 –

L „ G „ G „ **M** „ „ „ „ & S a „ D () m f c t : T f
 m tc a a c y m g a B ai a d La g age, 84, „ „

S a g a G a & M w M () at a z t f ct N m f a m
 a g m f m g a m f afma t ya a c m xty J al f E e i e xl
P ch l g : H a Lea i g a d Me , 6, 1 - 1

T ffM & L () S m m c c g a g J al f E e i e xl
P ch l g : Lea i g Me , a d C g i j , 23, 1 -

a aa H & a tt G () F c y ffct t c g f x z a
 ma c m J al f P ch l g i jic Re ea ch, 17, -

W L & M S () T c f tt m g f w ct
Q a xl J al f E e i e xl P ch l g , 44A, - 1

W () c ta a a c ct t a t Ac a P ch l -
gica, 26, 1 -

W () ffct ff c y t a t a am g f ct A e ica
J g al f P ch l g , 8L, 1 -

Lw t () T f m tc a a c y t c a g at t f
D t c m La g age a d C g i jive P ce e , 9, 1 -

Lw t t & D m () M g ffct c ct :
c f m ct a m La g age a d C g i jive P ce e , 15, 1 -

Lw t t & D m () W a w m g yc m xw
t a yw t a m g ct B ai a d La g age , 8L, 1 -

APPENDIX A

Critical pictures in Experiment 1a (Chinese), 1b (English), and 1c (Chinese).

<i>C digi</i>	<i>L(h)</i>	<i>L(l)</i>	<i>H(h)</i>
斑马 z a	皇冠 c w		
阳台 a c y	鸵鸟 t c		蜡烛 a
土豆 at t	芹菜 c y		苍蝇 f y
樱桃 c y	恐龙 a		耳朵 a
羽毛 fi t	熨斗		窗户 w w
山羊 a t	螃蟹 ca		玉米 c
信封 g	帐篷 t t		冰箱 f g a t
火山 a	烟斗		太阳
花瓶 a	台灯 a m		老虎 t g
水壶 tt	秋千 w g		手套 g
手表 w t	钢琴 a		苹果 a
沙发 c c	轮胎 t		

APPENDIX B
Critical pictures in Experiment 2a, 2b, and 2c.

<i>C digi</i>	<i>L(h)</i>	<i>H(h)</i>
- a t	T ma	M a - x
c w	b y g	a e
T t m -	dD t a	ea
M a m w	W m	a ta
M a	W ea	Ha
w t	m -t	K ya
a	a c a	a a
W a w	w y	T ta
M t e g	Sa -	L t
L tc	H -a	N w a
tt f y	-g	f
c - a t	D g	W t m
S - a t	L g t	F -a c