E B a R (2007) 176:616 629
DOI 10.1007/ 00221-006-0635-

RESEARCH ARTICLE

a a ff a a

D a a a G P
E a a La a a

R : 26 S b 2005 / A : 16 J 2006 / P b : 10 A 2006

A a T a S ff (. ., a a a) a a a . T a a a a 4 £ 4 , a , . I 1, ff ffi a a . T S ff b a a a a (a a ff). T a b a ab , a a a ff a . I 2, a a a a , a fi ff a a S ff a . I a ba a a a a a- a .

K S ff V a a S a a La a ff A a R a a

I

I a a , a a fi a a a a ff a a . T ff a a a a b a b S a (S a R 1967) a a a a a (. .,). A a a b a a a -a a a a . I a a S ff a - a (L a P 1995; R b a . 1997). W a a a a a , a (. ., a a a), a a a a a a a , a a a (K b 1994; K b a . 1990). T a a a -a a , a ff . F a , a b a a a

D. Z a X. Z (&)
D a P , P U ,
B 100871, C a
- a : 104@ .

X. Z
S a K Lab a C N
a L a , B N a U ,
B 100875, C a

X. Z
L a a C Lab a ,
Ca a N a U , B 100037, C a

D. Z a
Ha T a C , Ha 310036, C a

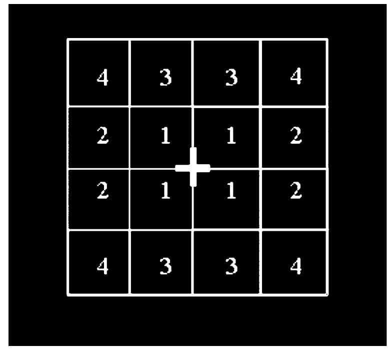
G. P E. La a a
D a P , U B a,
B a 40127, I a

a a a a b . . . A (. ., H 1993b; Wa W b 2004; Z ba B 1995). E (. ., a L bb a . 1999, 2004), (b Wa a . 2005). I . T S ff . T S ff , a . A ab , . H , . T : *the referential-coding account* a *the attention-shift account*. T (H , 1993a) a (. .,) . T (P a L 1994; R b a . 1997; S ff 1991; S ff a U a 1997; S ff a Ya 1994), . M , T . F , N a U a (1989) , 3, . I 500 fi . A . A S ff

a (. ., a), . T ( ) (a R b a . 1997). N a U a (1994) S ff b a . T ; . I a fi a S ff . F , N ba a S (2003) a . A S ff H (1993a), . H L a (1995) . I , S ff 90°. T : . T fi a (a P a L 1994). A , N a U a (1989) . T ff a . H : a . T ff b . T fi . W . O

I a a a . O a , a . T b ( ) a a . T (RT) a RT RT £ , a ffi b b ffi .

R , a a b a (. ., B a. 2002; H a W 1998; Ma a. 2001; W a. 1989; W a a L 1999, 2003; Z a S b 1997; C a 1999, a). A a b a a . O . I a . I a . T a C F . 1. S a 4 £ 4 , a . C (a fi a). I a S ff b b , b ff b fl b a . I , a S ff ff . S fi , b a - b a . I S ff a b a . C a, a , ,



F . 1 T 4 £ 4 a a fi a a a a . L a b b a . T *numbers* a a fi a . T fi a a b a a

a a a a , a a , a a . I S ff a b a , a S ff b b a . W a a S ff a a a S ff a ff .

N , a T S ff . T a ff . A a b , b b a b , a a a , a b a (Da a. 2001; La b a. 1992; R a a P 1996; U a a L 1987). O , a , a . A a , a a b a b a . W a a a , a , a b a a , a a a . T , S ff a b b b a a .

T ff a ffi b a a ff . T , a a ff ffi 1 a ff fl b a ffi . I a a ab

a . T a
a a , a , a S
. A a F . 1, 4 £ 4
4 , a
a fi a . A a
a a a a a .
T a a , a 6, 11
16 a . Ta b
-
a . T a a , -
a a , a a a
. T b a a
a a ba a a a -
a a a a .
I a , 1 a 2 a ,
a a a a
(a - a). T a -
3 a b a
ba a a b a a
a . T a a -
a a a
a a ff

T E E ff E a aE

F a aE , a RT a E a Ea E a - a E a a Tab 1. RT 3 a E a 3 (a E) £ 3 ( ) £ 4 (a Ea) £ 2 (E E) a a a a E (ANOVA), a E a a b a E a aE , a , a Ea a E E a - a E a aE . T a ff E a E a fiEa , $F(2, 43) = 278.94$, $P < 0.001$, RT a - 1 a E (545), 3 a E (1,471), a 2 a E (758). N , a ff E a a - fiEa , $F(2, 86) = 269.17$, $P < 0.001$, RT a a 6 (814), a 16 (1039), a a 11 (921). T a 1 a E 3.6 / 1 a E , 24.6 / 2 a E , a 39.0 / 3 a E . T a E E a - ab a 3 a E a 96.5 / . T aE b a a E a fi- Ea , $F(4, 86) = 55.69$, $P < 0.001$, Ea a E a RT ff a - ff a E .

T a ff E a Ea a fiEa , $F(3, 129) = 133.06$, $P < 0.001$, RT a a Ea- 1 (821), a Ea 4 (1,004), a a Ea 2 a 3 (930 a 944). A ff E b Ea fiEa B - E E a E a ($P < 0.001$), E ff E b Ea 2 a 3. T aE b a Ea a a E a fiEa , $F(6, 129) = 14.67$, $P < 0.001$, aE b Ea a , $F(6, 258) = 13.66$, $P < 0.001$, a - a aE b Ea , a a E , $F(12, 258) = 6.66$, $P < 0.001$. T Ea - EE E ff E a a E (E. Ca a E a. 1995; Ca a E a F 1997). M a , a ff E E E a fiEa , $F(1, 43) = 13.93$, $P < 0.005$, RT a E a (913) a E a (936). T aE aE , $F(2, 86) < 1$, a E , $F(2, 43) = 1.15$, $P > 0.1$. T - a aE b E E , a a E a fiEa , $F(4, 86) = 1.23$, $P > 0.1$. H , aE fiEa a Ea , $F(3,129) = 4.83$, $P < 0.005$, Ea a aE a E a a E , a S ff E a

a 1 M a RT ( ) a a a (a § SD), a E a (a) a aE 1, 2 a 3 a E 1, a 4 (-) a E 2

S a E	S	C E	L Ea			
			1	2	3	4
1	6	C	497 § 31 (3.1)	503 § 37 (1.8)	524 § 32 (2.9)	559 § 27 (3.4)
		I E	509 § 30 (3.4)	515 § 27 (5.5)	527 § 22 (5.7)	569 § 28 (8.1)
	11	C	498 § 35 (2.3)	516 § 45 (3.1)	566 § 36 (3.4)	580 § 33 (4.4)
		I E	514 § 22 (4.7)	546 § 40 (5.2)	565 § 35 (6.3)	607 § 36 (6.8)
	16	C	513 § 47 (2.1)	536 § 45 (3.1)	578 § 46 (3.9)	591 § 52 (5.2)
		I E	521 § 46 (3.6)	551 § 49 (5.7)	588 § 48 (6.0)	603 § 51 (7.3)
2	6	C	557 § 31 (2.1)	594 § 37 (2.9)	642 § 32 (4.2)	682 § 27 (5.2)
		I E	559 § 30 (4.7)	628 § 27 (8.6)	660 § 22 (7.0)	738 § 28 (13.0)
	11	C	595 § 35 (1.8)	723 § 45 (2.9)	793 § 36 (3.9)	848 § 33 (3.1)
		I E	611 § 22 (3.4)	760 § 40 (8.3)	824 § 35 (7.3)	855 § 36 (8.9)
	16	C	641 § 47 (1.3)	940 § 45 (6.0)	951 § 46 (8.9)	1003 § 52 (6.0)
		I E	647 § 46 (5.7)	963 § 49 (8.1)	942 § 48 (9.1)	1031 § 51 (10.4)
3	6	C	1,235 § 30 (5.7)	1,305 § 36 (5.2)	1,313 § 31 (3.1)	1287 § 26 (6.8)
		I E	1,218 § 29 (2.1)	1,303 § 26 (4.7)	1,253 § 21 (2.3)	1,359 § 27 (4.9)
	11	C	1,317 § 33 (4.7)	1,468 § 44 (6.8)	1,468 § 34 (7.4)	1,514 § 32 (8.9)
		I E	1,259 § 21 (7.0)	1,543 § 39 (5.7)	1,518 § 34 (4.7)	1,610 § 35 (9.4)
	16	C	1,539 § 46 (8.6)	1,627 § 43 (8.3)	1,624 § 45 (10.2)	1,748 § 51 (11.5)
		I E	1,546 § 45 (9.4)	1,711 § 47 (8.9)	1,652 § 46 (7.0)	1,895 § 49 (11.2)
4	6	C	497 § 16 (2.3)	509 § 18 (2.1)	505 § 17 (2.9)	4,94 § 13 (2.9)
		I E	504 § 16 (4.2)	512 § 16 (1.8)	514 § 16 (2.3)	528 § 13 (5.5)
	11	C	497 § 14 (2.1)	499 § 13 (1.8)	509 § 14 (4.4)	510 § 18 (2.1)
		I E	522 § 18 (4.7)	526 § 14 (1.6)	515 § 18 (2.6)	526 § 12 (2.9)
	16	C	499 § 16 (2.6)	503 § 13 (1.3)	517 § 16 (2.1)	520 § 14 (1.3)
		I E	522 § 23 (4.2)	523 § 17 (3.9)	528 § 14 (2.6)	530 § 16 (3.4)

ff a a . F 3 a a RT a ff a , a a . M , a - , a a a fi a , $F(6, 129) = 2.38$, $P < 0.05$, a a a ff a fl b a ffi . S ff a a a a a a , a a a ff b ff S ff b a . I a , a a ff a 1, 2 a 3 9.5, 23.5, a 87 , , a a a a . S a a a a - ff a ff , a a , a a a a b a a . A a- 1, a ff a fi- a , $F(1, 45) < 1$, a a a , $F(2, 45) = 1.35$, $P < 0.1$, , $F(2,$ 90) < 1. S a , a a 3, a a ff , $F(1, 45) < 1$, a a a , $F(2, 45) < 1$, , $F(2, 90) = 1.22$, $P > 0.1$. T a a S ff a ab a a 1 3 (F . 3). A a 2, a ff a fi a , $F(1, 45) = 9.46$, $P < 0.005$, b ff a a , $F(2,45) < 1$, , $F(2, 90) < 1$. A a 4, b a ff , $F(1,45) = 23.37$, $P < 0.001$, a a b a a , $F(2,45) = 6.85$, $P < 0.005$, fi a , a a b a a , $F(2, 90) < 1$. F a a a - ff a fi a a 4 1 a , $F(1,15) = 12.13$, $P < 0.005$, 2 a , $F(1,15) = 5.87$, $P < 0.05$, a 3 a , $F(1,15) = 13.52$, $P < 0.005$, a ff a a a T 3 a (105) a 1 a 2 a (17 a 30 ,).

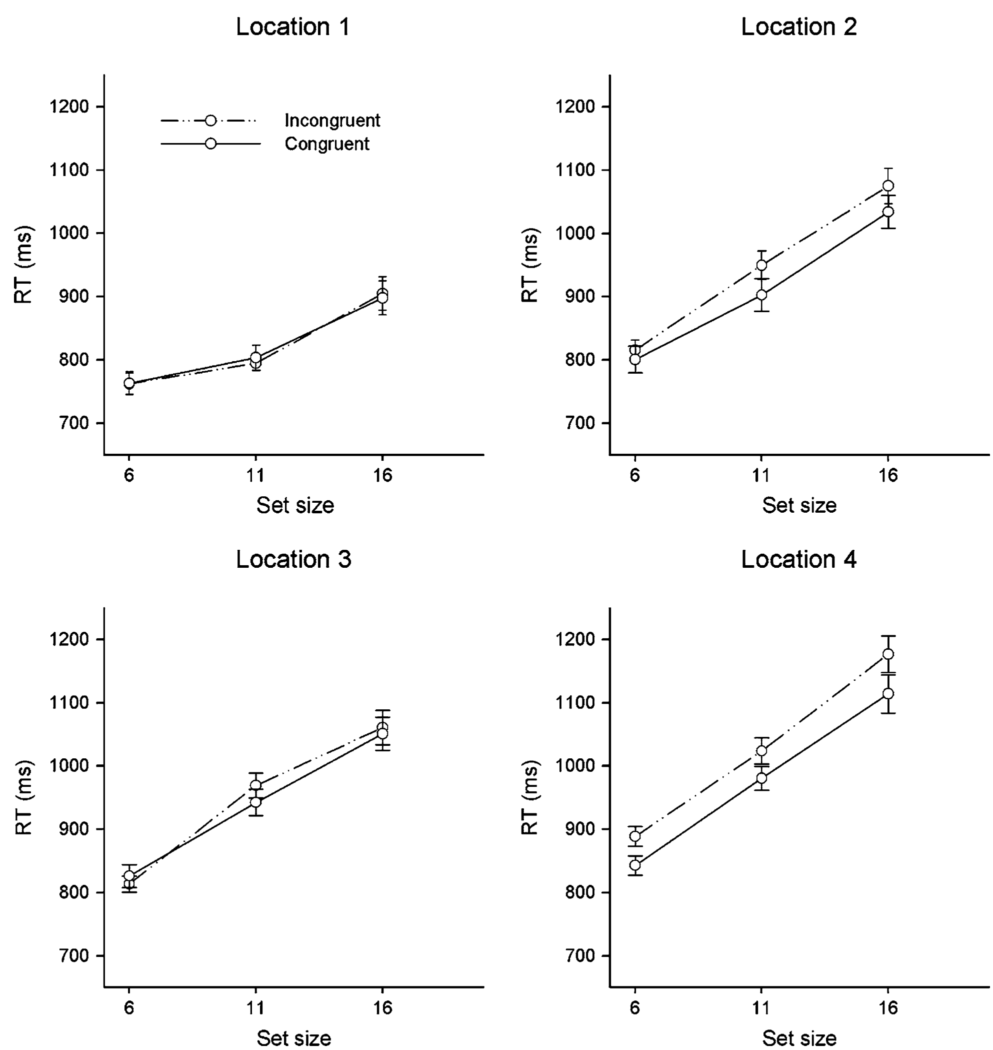


Fig. 3 T RT a - a - a a , a a - 1

E a a aE a a ANOVA, a E a a b a E a aE , a , a a E E a a aE . T a ff E a E a fi a , $F(2, 45) = 1.26$, $P > 0.1$, a a ff b a E . T a ff E a fi a , $F(2, 90) = 14.37$, $P < 0.001$, a b a 16 (7.0%), a 6 (4.9%), a a 11 (5.4%). T a ff E a a a fi a , $F(3, 135) = 16.42$, $P < 0.001$, a b a 4 (7.5%), a 1 (4.2%), a a 2 a 3 (5.6 a 5.7%, E).

T a ff E E E a fi a , $F(1, 45) = 15.71$, $P < 0.001$, E E (6.7%) a E E (4.8%). I a , E E ff E aE a , $F(3, 135) = 2.93$, $P < 0.05$, a - a aE b E E , a a E a fi- a , $F(6,135) = 1.20$, $P > 0.1$. S a a a a E E E E ff E a ff , a E E a a aE a a E a a b a E a aE . R a RT a a , E E ff E b fi a a L a 2, $F(1, 45) = 14.65$, $P < 0.001$, a a 4, $F(1, 45) = 14.12$, $P < 0.001$. T ff E a fi a a L a 3, $F(1, 45) = 2.01$, $P > 0.1$, a aE fi a E a L a 1, $F(1, 45) = 5.62$, $P < 0.05$.

T E E ff E a aE

RT a aE 1 a 2 a E , E a a E a , Tab 2.

RT a a a 2 (a E) £ 4 (a a) £ 2 (E E) a a a a E (ANOVA), a E a a b a E a aE , a a a E E a a E a aE . T a ff E E - E a fi a , $F(1, 30) = 21.87$, $P < 0.001$, RT a E (489) a E - (510). T aE b E - E a a a fi a , $F(3, 90) < 1$, - a aE b E E , a , a a E , $F(3, 90) = 1.32$, $P > 0.1$, - a E E ff E a aE a a , E a a a ff E a aE . A fi a ff E a a ff E a , $F(3, 90) = 26.97$, $P < 0.001$, RT b E a a 1 4 (482, 498, 501 a 517 , E).

E a a aE a a ANOVA, a E a a b a E a aE , a a a a E E a a E a aE . T a ff E a E a fi a , $F(1, 30) < 1$. T a ff E a a fi a , $F(3, 90) = 4.32$, $P < 0.01$, a b - a a 4 (7.1%), a a 1 (3.9%), a a a 2 a 3 (5.7 a 5.9%, E). T a ff E E E a a fi a , $F(1, 30) = 14.85$, $P < 0.01$, E E (7.7%) a E - E (3.7%). H , aE b E E a a , $F(3, 90) = 1.41$, $P > 0.1$, a - a aE b E - E , a a a E , $F(3, 90) < 1$, fi a . T , a a a - RT a a .

I a , aE -ab E - a S ff E .

RT b

T b a ff E b S ff E a ff a ff - , RT b aE a a , aE a E a ' RT aE a E a E , a (Ra E ff 1979; J a . 1994; Z a a K b 1997). B a aE b E E a a a fi a , a a b a a , E a a a - , a E E RT E aE

a 2 M a RT ( ) a a a (a § SD), a E a (a) a aE 1 a 2 a E 1, E a a E a

	L a			
	1	2	3	4
C	474 § 11 (2.5)	485 § 10 (4.0)	492 § 8 (2.7)	505 § 11 (5.5)
I E	491 § 9 (5.3)	511 § 9 (7.8)	510 § 9 (8.7)	530 § 9 (8.7)

Ea . T a a a 3
(a E) £ 4 (Ea) £ 2 (E E) £ 5
( ) ANOVA.
N , a ff E E E a
fiEa , $F(1, 45) = 15.51$, $P < 0.001$, a
ff E , $F(4, 180) = 1106.12$, $P < 0.001$. I -
a , aE b E E a -
a fiEa , $F(4, 180) < 1$, - a
aE b E E , , a a E
, $F(8, 180) < 1$. T a
S ff E E a , . .,
RT . T a ff E Ea a fi-
Ea , $F(3, 135) = 127.66$, $P < 0.001$, aE
b E E a Ea , $F(3, 135) = 5.40$,
$P < 0.05$. B - a aE b E -
E , Ea a a a a -
fiEa , $F(12, 540) = 1.67$, $0.05 < P < 0.1$,
a E S ff E a Ea 2 a 4
a ab E S ff E a Ea 1 a 3
a aff E b .
T RT b aE -ab E -
a 2 (a E) £ 4 (a
Ea) £ 2 (E E) £ 5 ((8(8..0)1)0.6ANOVA.
T a ff E a E a fiEa ,
$F(1,30) = 1.18$, $P > 0.1$. B a ff E E -
E a a ff E fiEa ,
$F(1,30) = 26.25$, $P < 0.001$, a $F(4,120) = 315.06$,
$P < 0.001$, E . B aE b
0.007 [(287390-4)8.5( )6( )0.2965 T 1.2651 TL 1.2651 3. 0.1663 T 0054 T 1.265a -0.00 .16630.1663 12(

a a : 3.3% a a 1, 2.1% a a 2, 2.8% a a 3 a 3.0% a a 4. M - a , a ff fi , $F(1, 15) = 4.72$, $P < 0.05$, - (3.3%) a - (2.3%). B a b a a fi , $F(3, 45) = 2.16$, $P > 0.1$, a ff a a a . RT b a a a a a - 2. S a ff a fi- , RT a a a a 1. T a a a 4 (a) £ 2 ( ) £ 5 ( ) ANOVA. Ma ff b a - fi , $F(1, 15) = 15.92$, $P = 0.001$, a $F(4,60) = 126.90$, $P < 0.0001$, . T a b a a fi , $F(4,60) = 7.51$, $P < 0.0001$, a S ff a a a RT a a RT (F . 4b). T a a - (. . D J a. 1994; Va a. 2005; W a a Wa 2005), a a a- ff RT a a b Z a a K b (1997). I - a a , a a a ff a , a RT a b . T a a a S ff - a , a fi a a a a b ab S ff 1. A a b a a a a fi a a a a . T a a , a a . T a b a a a a a a a a .

G a

F a a b ab , a S ff a a a , b a a a ff a a a a . I ffi a a , S ff a a a a - a fi a , a a a fi a . T fi a , - a, aff b a , b . I a , a a ff a

fl b a ffi . O a , a a a a , a a ffi a a , - a S ff b a ff a a a . O fi a ff a a b a a a a - a a a a a , a a fi a . H , , ffi - a a , a , a a a a , a a a a S ff . B ab a a ff a a - a a a a a . W a , a a a . Ba fi , b a a ff a a- a a a S ff a a . I a , a a S ff b a a b a a a a . D a a , a a , a a a b a a a . W a a (. ., a 2 F . 1), a a a b a b a - a a . T a a a (. .,) a a , a a S ff b . H , a a (. ., a 1 F . 1), a b a a a a a a a a , a b a a a b a a a (. ., a 2 F . 1). I a a , a b - a a . T , a a a , a a L a 1 F . 1 ba- b a a , a a S ff . T , a a S ff fl a a a a ff a- a a a . T b a a a . I , a b , a a a a , -

R

B E, G a T, Fa A, B C, C a L (2002) S a a E a a a E : a E b a- a a . J C N E 14:980 993

Ca a E M, F DS (1997) C E a fi a a E E ff E a a E . V R 37:63 82

Ca a E M, E DL, C a I, Ka SM (1995) T E E ff E: a E E aff E a E E E a E . P E P E 57:1241 1261

C a L (1999) S a a E a a a E : a E E a a E . P E R 62:195 219

Da S, K A, Wa R (2001) E a ba E a : E a a a E a a . J E P E H P E P 27:494 503

J R, L a C-C, La b E (1994) C a a E - a a a E : a a E ff E a- a - E E . J E P E H P E P 20:731 750

H B (1993a) T a S ff E. P E R 55: 208 222

H B (1993b) T ff E a a E a a , E a a a E a b . B P E S E 31:387

H B (1994) Eff E a a a S R E a b E . P E R 56:179 184

H B, L a Y (1995) S-R E a b ff E E - - a a E . P E B R 2:370 374

H TS, W JM (1998) V a a E a . Na- 394:575 577

K b S (1994) T a a a E a a : a S - a S . P E R 56:130 135

K b S, Ha b E T, O a A (1990) D a - a : E ba - E a b a a a . P E R 97:253 270

La b K, Ta G, D a G (1992) Eff E E a a - E a b . A E a P E 79:115 130

L a GD (2003) S - ff E : E E E E a a . J E P E H P - E P 29:741 757

a L bb RHJ, W b JC (1999) T fl E a E E a E a a a a a - a a . B P E 51:1 21

a L bb RHJ, Ja P, V R (2004) M E a a a E a - S a . P - E R 69:179 190

L C-H, P E RW (1995) T fl E a E a a E : a S a a- a S ff E . P E B R 2:174 207

Ma C, B a I, S S, S a K, Ca a S (2001) T a- a a a a E E a a a E : E E . E J N - E 13:364 372

N E R, U a C (1989) S a a E a . J E P E H P E P 15:164 169

N E R, U a C (1994) A E a a E . P E R 56:144 150

N ba W, S E (2003) I a a a E . P E R 67:253 260

P E RW, L C-H (1994) R a E a a - a E S ff E. P E R 56:185 195

P E RW, Va a T, L CH, W DJ (1993) S - E a ab E aff - a E E a E . J E P E H P E P 19:81 91

Ra E ff R (1979) G a E b a a a - b a E. P E B 86:446 461

R a TE, P E RW (1996) M a a E a a a E E - a E a . P E R 59:196 211

R b E S, N E R, Ia C (1997) T S ff E E - a E a a . J E P E