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

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

I

I a a , a a a fi a a a a aff a a a 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 a a b a a a a -a a a a a a . I a a S ff a - 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 a a a a , a - a a (K b 1994; K b a. 1990). T a a a a -a a a - , a a a ff. F a , a b a a a a 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

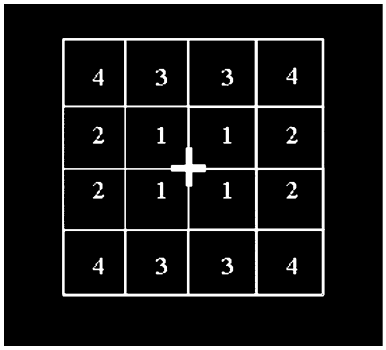
D. Z a
Ha T a C , Ha 310036, C a

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

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

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

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



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

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

a . T a a
a a , a , a S
. A a F . 1, 4 £ 4
4 , a
a fi a . 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
(a - a). T a - a
3 a b a a
ba a a b a a
a . T a a a -
a a a a a
a a ff

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

T a ff a a a fi , $F(3, 129) = 133.06$, $P < 0.001$, RT a a a- 1 (821), a a 4 (1,004), a a a 2 a 3 (930 a 944). A ff b a fi B - a a a a ($P < 0.001$), ff b a 2 a 3. T a b a a a a a fi , $F(6, 129) = 14.67$, $P < 0.001$, a b a , $F(6, 258) = 13.66$, $P < 0.001$, a - a a b a , a a a , $F(12, 258) = 6.66$, $P < 0.001$. T a - ff a a (. Ca a a . 1995; Ca a a F 1997).

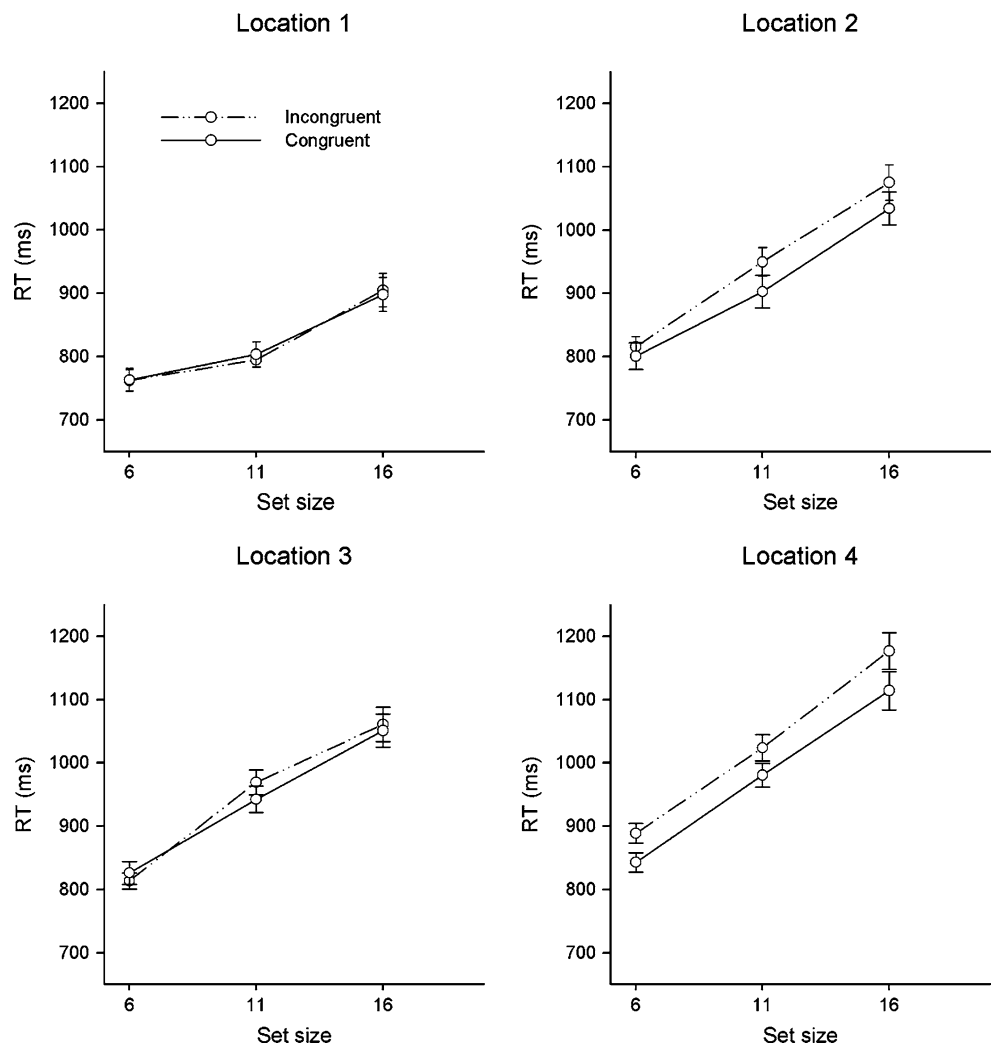
M a a , a ff a a fi , $F(1, 43) = 13.93$, $P < 0.005$, RT a a (913) a a (936). T a a , $F(2, 86) < 1$, a a , $F(2, 43) = 1.15$, $P > 0.1$. T - a a b a , a a a a fi , $F(4, 86) = 1.23$, $P > 0.1$. H , a fi a a , $F(3,129) = 4.83$, $P < 0.005$, a a a a a , a S ff a

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

S a	S	C	L a			
			1	2	3	4
1	6	C	497 § 31 (3.1)	503 § 37 (1.8)	524 § 32 (2.9)	559 § 27 (3.4)
		I	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	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	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	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	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	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	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	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	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	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	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	522 § 23 (4.2)	523 § 17 (3.9)	528 § 14 (2.6)	530 § 16 (3.4)

ff a . F 3 a a RT a ff , a . M , a - , a a a a fi , $F(6, 129) = 2.38$, $P < 0.05$, a a a ff a fl b a ffi . S ff a a a a a a 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 a . S a a a a - ff a ff a ff , a a a a a a a a b a 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 S ff a ab a 1 3 (F . 3). A a 2, a ff a fi , $F(1, 45) = 9.46$, $P < 0.005$, 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 a , $F(2,45) = 6.85$, $P < 0.005$, fi , 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 a T 3 a (105) a 1 a 2 a (17 a 30 ,).

F . 3 T RT £ a - a - a , a a a a a - 1



E a a a a ANOVA, a a a b a a , a a a a a . T a ff a a fi , *F*(2, 45) = 1.26, *P* > 0.1, a a ff b a . T a ff a fi , *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 a a fi , *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%,).

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

T ff a a

RT a a 1 a 2 a , a a , Tab 2.

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

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

I a , a -ab S ff .

RT b

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

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

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

. T a a a 3 (a) £ 4 ( ) £ 2 ( ) £ 5 ( ) ANOVA.

N , a ff a fi a , $F(1, 45) = 15.51$, $P < 0.001$, a ff , $F(4, 180) = 1106.12$, $P < 0.001$. I - a , a b a - a fi a , $F(4, 180) < 1$, - a a b , , a a , $F(8, 180) < 1$. T a S ff a , . ., RT . T a ff a fi- a , $F(3, 135) = 127.66$, $P < 0.001$, a b a a , $F(3, 135) = 5.40$, $P < 0.05$. B - a a b - , a a a a a a - fi a , $F(12, 540) = 1.67$, $0.05 < P < 0.1$,

a S ff a a 2 a 4 a ab S ff a a 1 a 3 a aff b .

T RT b a -ab - a 2 (a) £ 4 (a) £ 2 ( ) £ 5 ( ) ANOVA. T a ff a a fi a , $F(1,30) = 1.18$, $P > 0.1$. B a ff - a a ff fi a , $F(1,30) = 26.25$, $P < 0.001$, a $F(4,120) = 315.06$, $P < 0.001$, . B a b

(a 1) a , a a a . T b fi .

O a , a a S ff - a . A a a , b a a a a , bab a a a a a a . W a a (a , a 2 F . 1) , a a a fi a , a a . A a a , - - a a a a , a a b a a - . B a , a a (a L a 1 F . 1), a a b a a ' . A a a a a b a a , a a a , a a a a a . T , a S ff b a a . T ab a a S ff - a S ff . I , a - fi a a a a a . T a S ff ff - a , a , a a a S ff a a a a a a a a - , a a a a . T a S ff - a -ab a aff b a - ' S a M a (2000) a L a (2003) (a P a. 1993) a . I b a a a (. .,), O - a , a a a a a , S ff ff a a - a a .

A a , ba a - S ff a a a - a (L a P 1995; R b a. 1997). T a a a b a , a a a a fl b (. ., H a W 1998; C a 1999). I , a F . 3 a a a a a a a a a a a a a a a a a a . T ff a a 2 a 4 b a a a 1 a 3. T b a a a a aff a a a a a a a , b a aff a a a a , a ab a a . T a RT b a a a ff a a a S ff a a RT a (. . J a. 1994; Va a. 2005; W a a Wa 2005). A Z a a K b (1997), a a S ff b ff a a a RT b . W a a a RT a a a a fia a ff , S ff a a RT a . I a, RT a a a a a : a a b a a , a a a a a . I ffi- a a a , a a a a a a a a a a a a a . T a b a a ab a a RT b a a a . H , ffia a RT b a - a a -ab a a a a . I b a a fl- a a a a a a a , a a a . A a I a , a a a a a a a a a S ff , a , a a a . G a - b a a ffia a a a S ff , a a a a b a ffia a a a a a a a a a a ff a a a a a a . O ba a a b a a ffia a a a a a ff , a a a a a a ff a b a ab b a a a a a a 2.

E 2

I ab a a a a - S ff a a a a a , a a a a b a ,

a a ab S ff
a a a
ff , b ffi-
fi a a a a
a a a a . C -
a a a fi a

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

a a , a a
S ff . I b
a S ff a ff a a -
a E 1 a -
a 2.
O a a a
a a a S ff
a a a (L a P
1995 a), b a a
a a a a a (Wa a. 2005)
a a a a -
a - a a a a . I Wa a'
, a a a , a
fi a , a
a a b a . Pa a
a a a O a a a a -
b a Q . I 1,
a a a a a -
b a ffi a a a a -
ab b a . A a
a a a b a ,
S ff a b a a a
, a . T , a
a a a a , a -
a a b a
a a a . S a a-
a a a b , b
a a . I Wa a.' 2, a
a a a a ab a ; , a -
a a a a b ba
. I a a a a , a
a a b a a b a
a S ff a a a a b
a a a a a a ab a a
a a a . S a a a a
a a b a a
a .
H (1994) a a
S ff a a . I
, a a a
a , a a a fi a-
. O a a a , a b
a a a (a) a ( ) a . Pa -
a a a
a . B a a a
fi

R

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

L C-H, P RW (1995) T fl a a a a a : a S a a- a S a ff . P 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 a a a a : a . E J N - 13:364 372

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

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

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

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

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

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

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

R b S, N R, Ia C (1997) T S ff a a a . J E P H P P 23:-14(3).15514