(2010) 1 1 1 2

ELSEVIER

NEUROPSYCHOLOGIA

: A

*, ,

Ce e f B a a d C e Sc e ce a d De a e f P c , Pe U e , Be 100871, C a
Ke Lab a f Mac e Pe ce a d I e e ce (M f Ed ca), Pe U e , Be 100871, C a
Ke Lab a f C a a L c (M f Ed ca), Pe U e , Be 100871, C a
De a e f A ed L c , C ca U e f C a, Be 100024, C a
De a e f C e e L e a e a d La a e, Pe U e , Be 100871, C a

ARTICLE INFO

A c e :
25 A 2009
6 2009
A 1 2010
2010

Ke d :
ss fi
400

ABSTRACT

A ( ) s s s s ss s s s s b ec + e b + e a + c a fie + b ec s s s ss fi ss fi s s s ss fi s fi s s: s s, s s

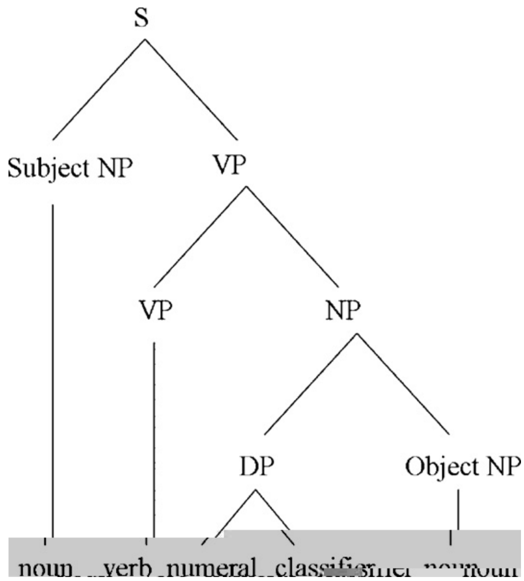

S
Subject NP
VP
VP
NP
DP
Object NP
noun
verb
numeral
classifier
noun

Fig. 1.

& , 2004; & , 2002), (& , 2008), (, 2003)

As

9 (s) s

+ + + ss fi +

ss fi (s . 1). ss fi

s fi (,)

(s . 1). A

ss, ss fi

(, 2000).

ss fi

(& , 2007).

(, 1965).

9 s s s .

ss fi (,)

ss fi

s (s 1).

2 × 2

ss fi

400 ss fi

fi (., 1999; & , 2000; & , 2002; ., 2009; ., 2006; ., 2004; , & , 2006; ., 2007).

(& , 2008; & , 2006).

400

400

400

400 ss

600 (, & , 2000; , & , 1997; ., 2004),

fi

ss fi

400

fl

fl

ss fi

ss ss fi , . .,

400

ss fi .

2. Methods

2.1. Pa c a

s (15 s, 18 26 s)

s. A 96 s,

A

A

2.2. De a d a e a

4. s (s).

fi

ss fi s (

ss fi

fi s (s

1).

ss fi s; ss fi

ss fi s;

ss fi s. ss fi

s. A

s (22.5 23.1)

s (17.2 17.3 > 0.1). A

s fi s, s ss fi

(, 2002),

ss fi s 8.0

Table 1

[illegible]

Condition	Exemplar sentence						Verb-classifier congruency	Verb-noun congruency	Classifier-noun congruency
Correct	小赵	修理	一	张	长椅	。			
	Zhao	repaired	one	zhang (classifying chair-or paper)	chair	.	✓	✓	✓
	Zhao repaired a chair.								
Classifier-noun mismatch	小赵	修理	一	台	长椅	。			
	Zhao	repaired	one	tai (classifying electric appliance)	chair	.	✓	✓	[illegible]
	Zhao repaired a chair.								
Verb-noun mismatch	小赵	修理	一	张	信纸	。			
	Zhao	repaired	one	zhang	writing paper	.	✓	×	[illegible]
	Zhao repaired a piece of writing paper.								
Double-mismatch	小赵	修理	一	台	信纸	。			
	Zhao	repaired	one	tai	writing paper	.	✓	×	[illegible]
	Zhao repaired a piece of writing paper.								
Triple-mismatch	小赵	修理	一	棵	信纸	。			
	Zhao	repaired	one	ke (classifying tree)	chair	.	×	×	[illegible]
	Zhao repaired a piece of writing paper.								

[illegible]

2.3. [illegible]

[illegible]

2.4. [illegible]

[illegible]

2.5. EEG [illegible]

[illegible]

Table 2

s s s s s. s fi s s, 5 s 1 s s s s s s.

							ss	
							(%)	
	4.71	0.10	4.70	0.20	12.1%	0.19	95.1	0.11
ss fi s	1.51	0.27	2.08	0.43	0.0%	0.00	95.0	0.07
s	4.74	0.11	1.92	0.31	0.0%	0.00	95.1	0.11
s	1.39	0.22	1.36	0.18	0.0%	0.00	95.0	0.07
s	1.39	0.23	1.25	0.18			22.8	0.18

s s s s s s s 5 Ω. s s fi ss 0.05 70 . s 500 .

2.6. Da a a a e

s s s s s (±70 µV) 90.9% s (92.1% , 90.4% ss fi s , 92.5% s , 89.2% s , 90.3% s). s s −200 s 800 s ss fi s ss fi s, s fi s 200 s s s s s ; s, s fi s 100 s s s s s ss fi s s s. s s s.

s s s s s, s s ss fi s: 300 500 s (400), 550 800 s s s s s, 2 × 2 s s A 9As fi s s, (ss fi (s. s s (s) s s. s s s: s ( ). s s s: s (s. s). s ss s (s), s s s: 3, 3, 7, 7 ; 4, 4, 8, 8 ; 3, 3, 7, 7 4, 4, 8, 8 s s A 9As. s A 9As, s s s s. s s ss fi s, s fi s s s ss fi ss fi .A 9As ss fi s ss fi s fi s ss s s (ss & s , 1959).

3. Result

3.1. Be a a da a

s 99.5% s s s, 99.6% s s, 94.2% ss fi s s, 95.2% s s s 91.4% s s. s s A 9A, $F(1, 25) = 21.17$, $p < 0.001$. s s s s s fi s s s s, $p < 0.005$, s s s s s, $p < 0.005$. s s s s s.

3.2. ERP da a

. 2 s s, s s s s s s s s s (. ., ss fi s), s (s), s s s s s s s . . 3 s s s s, s s s s s 3 4 s s s s s s s s s , s s s s, s s s.

3.2.1. Ob ec e 300 500 e d

A 9As s fi , $F(1, 25) = 16.120$, $p < 0.001$, , $F(1, 25) = 12.719$, $p < 0.005$; ss fi , $F(1, 25) = 41.36$, $p < 0.001$, , $F(1, 25) = 38.94$, $p < 0.001$; s fi ss fi , $F(1, 25) = 10.40$, $p < 0.005$, , $F(1, 25) = 7.09$, $p < 0.05$. s fi s s s s s s 400 s s s s s s s s.

s ss fi . s s ss fi , −1.84 µV , $F(1, 25) = 35.79$, $p < 0.001$ −1.12 µV , $F(1, 25) = 24.28$, $p < 0.001$. s s ss fi , $Fs < 1$ s s (s . 4) s s s s s ss ss fi s fi .

, ss fi s s s s s . s , ss fi s −2.39 µV , $F(1, 25) = 45.53$, $p < 0.00$, s −1.44 µV , $F(1, 19) = 39.14$, $p < 0.001$. s ,

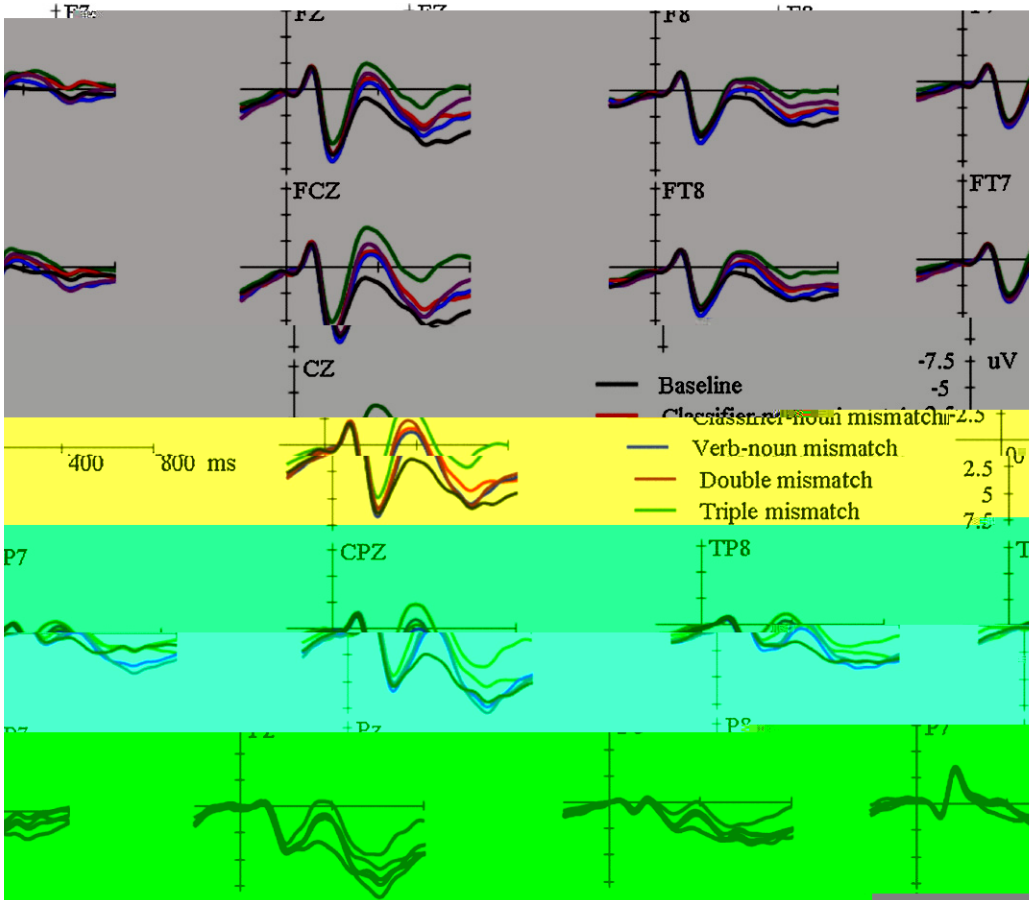


Fig. 2. ... 200 ... 800 ... 13 ...

... ss fi ... (−0.53 μ9) ... fi ... , $F(1, 25) = 5.09$, $p < 0.05$, ... fi ... , $F < 1$. ... fi ... ss fi ... ss fi ... , $F(1, 25) = 3.97$, $p < 0.05$, ... , $F(1, 25) = 4.17$, $p < 0.05$, ... 400 ...

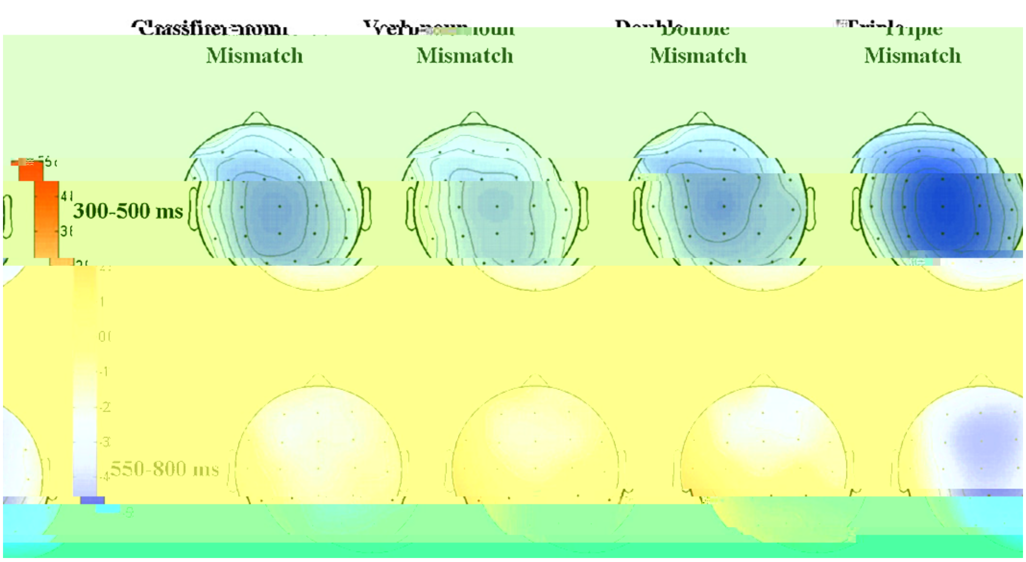


Fig. 3. ...

Table 3
s s s 400 s s 300 500 s .

	s s			s. ss fi			s.			s.		
	F		*ε*	*F*		*ε*	*F*		*ε*	*F*		*ε*
	1,25	39.73	<0.001 1.00	1,25	11.13	<0.005 1.00	1,25	15.51	<0.005 1.00	1,25	6.61	<0.05 1.00
×	4,100	7.87	<0.005 0.49	4,100	2.16	0.12 0.54	4,100	3.54	<0.05 0.59	4,100	2.21	0.12 0.53
	1,25	39.42	<0.001 1.00	1,25	10.61	<0.005 1.00	1,25	12.44	<0.005 1.00	1,25	3.42	0.08 1.00
×	1,25	15.21	<0.005 1.00	1,25	8.13	<0.01 1.00	1,25	3.19	0.09 1.00	1,25	1.75	0.20 1.00
×	1,25	0.12	0.73 1.00	1,25	0.10	0.75 1.00	1,25	0.15	0.70 1.00	1,25	0.89	0.35 1.00
× ×	1,25	4.33	<0.05 1.00	1,25	2.00	0.17 1.00	1,25	3.90	0.06 1.00	1,25	3.57	0.07 1.00

N e: = s ; = ; = ; = s .

Table 4
s s s 550 800 s .

	s s			s. ss fi			s.			s.		
	F		*ε*	*F*		*ε*	*F*		*ε*	*F*		*ε*
	1,25	26.46	<0.001 1.00	1,25	13.66	<0.005 1.00	1,25	29.23	<0.001 1.00	1,25	21.53	<0.001 1.00
×	4,100	10.69	<0.001 0.62	4,100	3.34	<0.05 0.56	4,100	2.51	0.09 0.56	4,100	13.25	<0.001 0.65
	1,25	24.03	<0.001 1.00	1,25	10.39	<0.005 1.00	1,25	28.99	<0.001 1.00	1,25	19.10	<0.001 1.00
×	1,25	20.33	<0.001 1.00	1,25	18.18	<0.001 1.00	1,25	8.36	<0.01 1.00	1,25	0.24	0.63 1.00
×	1,25	10.36	<0.005 1.00	1,25	0.01	0.92 1.00	1,25	0.01	0.99 1.00	1,25	14.86	<0.005 1.00
× ×	1,25	0.16	0.69 1.00	1,25	1.56	0.22 1.00	1,25	0.37	0.55 1.00	1,25	0.04	0.85 1.00

N e: = s ; = ; = ; = s .

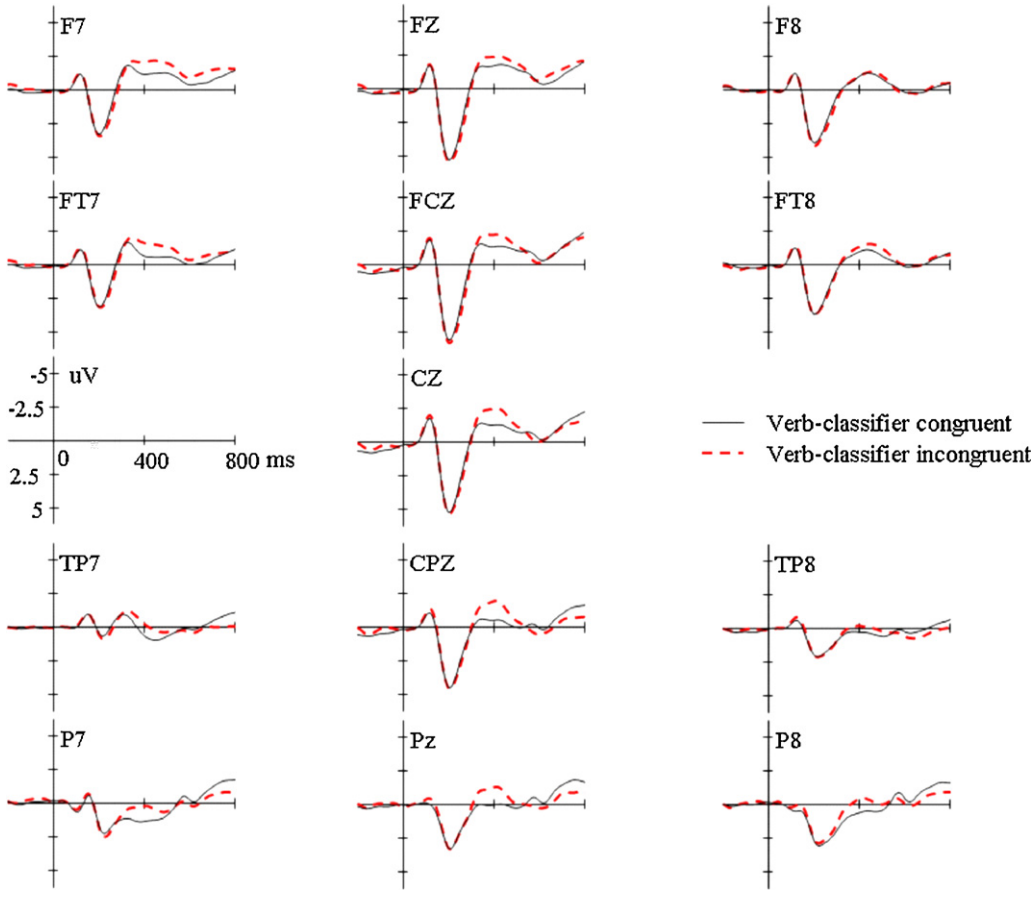


Fig. 4. s ss fi ss fi s s 13 s, 200 s 800 s s ss fi .

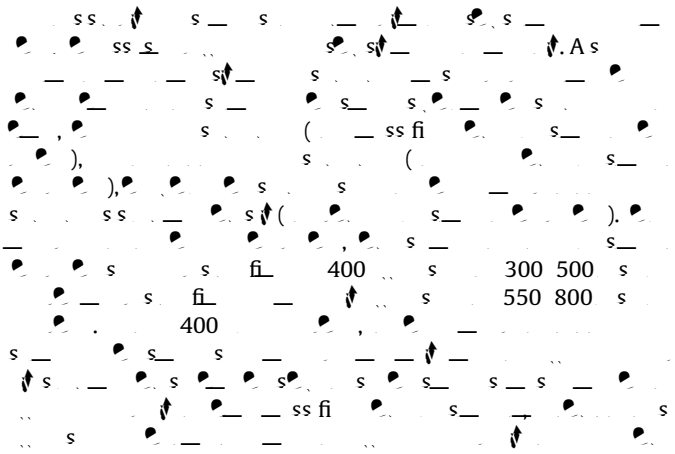
/ ss , s s s s s. As s s. 2 3 3, s s s s 400 s s s s s, s s s s s .

3.2.2. Ob ec e 550 800 e d

A 9As s fi ss fi (−0.75 μ9), $F(1, 25) = 5.97$, $p < 0.05$, (−0.56 μ9), $F(1, 25) = 4.75$, $p < 0.05$, s s ss fi s s s s s s. s , $F(4, 25) = 20.30$, $p < 0.001$, $\varepsilon = 0.48$, , $F(1, 25) = 26.17$, $p < 0.001$, s s s . 3; : −2.43 μ9 , $F(1, 25) = 22.18$, $p < 0.001$; −1.07 μ9 , $F(1, 25) = 10.06$, $p < 0.005$; −0.91 μ9 , $F(1, 25) = 5.87$, $p < 0.05$; : −0.99 μ9 , $F(1, 25) = 16.31$, $p < 0.001$.

A s s fi , s s , $F(1, 25) = 11.66$, $p < 0.005$, s s s s (0.66 μ9), s s , $F(1, 25) = 7.55$, $p < 0.05$ (s . 3). , $F(4, 100) = 19.06$, $p < 0.001$, $\varepsilon = 0.564$, , $F(1, 25) = 4.755$, $p < 0.05$. s s s , −0.83 μ9 , $F(1, 25) = 5.89$, $p < 0.05$; −0.80 μ9 , $F(1, 25) = 4.32$, $p < 0.05$; , −0.99 μ9 , $F(1, 25) = 8.31$, $p < 0.01$. s , , s

4. Discussion



[illegible] 400 [illegible] fl [illegible] fi [illegible] ss s; [illegible] fl [illegible] ss s (s [illegible] 4.3).

4.2. T[illegible] e a e[illegible] a[illegible] d e[illegible] e a[illegible] c[illegible] ce [illegible] e [illegible] e[illegible] e e [illegible] c [illegible] e

A [illegible] fi [illegible] ss fi [illegible] 600 [illegible] 600 [illegible] 2000; 9[illegible], 2007 [illegible] s). [illegible] 600 [illegible] 1996; [illegible] 2000; [illegible] 1991; [illegible] 1992) [illegible] 9 [illegible] 1998; [illegible] 1993; [illegible] 1997; [illegible] 1997; [illegible] 1995), [illegible] 1998; [illegible] 2001; [illegible] 1992). [illegible] 600 [illegible] fl [illegible] 1995). [illegible] 600 [illegible] *e a [illegible] ca e, [illegible] 2005), [illegible] (. . . F[illegible] e b ea fa[illegible] e e [illegible] d[illegible] a . . ., [illegible] 2003, 2006 [illegible] 2007) [illegible] (. . . ef[illegible] ed e[illegible] ac e . . ., [illegible] 2004; [illegible] 2003; [illegible] 2005, 2006; [illegible] 2007). [illegible] 600 [illegible] fl [illegible] 2007; [illegible] 2008, 2009 [illegible] fl [illegible] 2007; [illegible] 2008). [illegible] 400 [illegible] 600 [illegible] 2006 [illegible]. [illegible] fl [illegible] 2005), [illegible] 2007; 9[illegible] 2007) [illegible] 2005, 2006; [illegible] 2006; [illegible] 2007; 2008; [illegible] 2008, 2009 [illegible] fl [illegible] 600 [illegible] 2003; [illegible] 2007) [illegible] fl [illegible] fl [illegible] 2007; [illegible] 2008,

2009 [illegible] ss fi [illegible]. A [illegible] 600) [illegible] fl [illegible] 2009; [illegible] 2008). [illegible] ss fi [illegible] 1), [illegible] ss fi [illegible] ss fi [illegible] 2006). [illegible] ss fi [illegible] ss fi [illegible] 1). [illegible] 3), [illegible] fl [illegible] fi [illegible] ss (s [illegible] 4.3). [illegible] 400 [illegible] 1997) [illegible] 2004) [illegible] 2006). A s [illegible] (. . . Je[illegible] fe[illegible] de a[illegible] e [illegible] e e e[illegible] a[illegible]; s 9 [illegible] 2007). [illegible] (2008) [illegible] (. . . a[illegible]) [illegible] (. . . b ead), [illegible] * [illegible] e b ead). [illegible] 400 [illegible] 600 [illegible] 1500 [illegible] fi [illegible] 2003; [illegible] 2008). [illegible] 9[illegible]), [illegible] (. . . ba[illegible] 2009; [illegible] 2007), [illegible]

4.3. T e ae e a a d e a c e e e a

550 … 800 … 300 … (… 2). … (… 9 & 9 s, 1995; 9 & 9 s, 1993; … 9 , & 9 s, 1997; … & 9 …, 2008; 9 … ., 1999, 2003; … , & 9 s, 1998). … (… ., 1998; … , & … , 2003; … , & … ss , 2007), … fi … (… , & … , 2008; … ., 2009). … ss fi … fi … . (2009) … fi (d …) … fi … (… fi … (…). … fi … fi … fi … ss fi … A … fi … ss (… , 2003) … (… ., 2008). … fi … ss fi …

Acknowledgments

… (30770712) … (2010 …8339004). … 104@ …

References

… (2008). … : A … J. … a f Me … a d La … a e, 59, 36 53.

… , A. (2006). … : A … J. … a f C … e Ne … c e ce, 18, 1829 1842.

… & 9 s, … (2000). … : … (…), T e c … e e … c e ce (2 … 881 895) … : … ss.

… & … (2007). … : … J. … a f Me … a d La … a e, 56, 103 128.

… (1965). A … ec … f e e … f … a … A: … ss.

… 9. … 9 … & 9 s, … (2005). … : … J. … a f E e … e a P c … : Lea … Me … a d C … , 31, 129 147.

… 9 … & 9 s, … (1998). … : … La … a e a d C … e P … ce e , 13, 21 58.

… 9. … & 9 s, … (1999). A … : … J. … a f Me … a d La … a e, 41, 469 495.

… 9. … & 9 s, … (1999). … : … C … e B a Re ea c , 8, 373 392.

… & … (2008). … fi … : … 400. P c … , 45, 554 558.

… , A. (1995). … : A … B a a d La … a e, 50, 259 281.

… , A. (2004). … T e d … C … e Sc e ce, 8, 245 247.

… , A. … & A … , A. (2006). … : … P ceed … f e Na … a Acade … f Sc e ce USA, 103, 2458 2463.

… , A. … & … (2000). 9 … : … fi … fi … J. … a f Me … a d La … a e, 43, 476 507.

… , A. … , A., & … 9. (2004). … Ne … e , 15, 165 169.

… , A. … , A., & … , A. (1996). … : … J. … a f E e … e a P c … : Lea … Me … a d C … , 22, 1219 1248.

… , A. … , A., … 9. … , 9., & … (2001). … : A … C … e B a Re ea c , 11, 305 323.

… , A. … 9., & … (1999). … : … Me … a d C … , 27, 438 453.

… , A. … 9. … , A., & … (1998). … B … ca P c … , 47, 193 221.

… ss … & … (1959). … fi … P c … e … a, 24, 95 112.

… A., & … (1997). … ss … P … c … , 34, 660 676.

… & … , A. (2003). … : A fi … J. … a f C … e Ne … c e ce, 15, 643 657.

. , . (2002). D c a f c a fie a e c e a C e e X a da a a c fa c d a . : ss.

, . (2003). s s s s . J a f C e Ne c e ce, 15, 883 899.

, ., & . (2000). , s s 600/ , s s s s . Ne c a, 38, 1531 1549.

, ., , ., & s , . (1993). s s s , s s ss . La a e a d C e P ce e, 8, 439 483.

, , ., , . A., s , ., & , 9. . (2004). s . Sc e ce, 5669, 438 441.

, A., & , A. . (2002). s s s s . C e B a Re ea c , 13, 339 356.

, A., & s , . (2001). s s s s ? A s s s ss s . s s . C e B a Re ea c , 11, 199 212.

, . A., , ., & , . (2007). s s : 400. B a Re ea c , 1146, 210 218.

, . (2000). Re ea c de C e e ea e d . X a da a a c a . : , ss.

s, . ., , . A., & s, . (2004). s : s . C e B a Re ea c , 19, 59 73.

, ., , ., & , . (2009). ss s fi s : . Ne c a, 47, 1799 1851.

, ., & , . (2009). ss s : A s s . Ne c a, 47, 1282 1293.

9 , . (2000). : s . J a f Ne c , 13, 57 82.

9 , ., , ., 9., , ., & , . (2007). ? A s s s . B a d La a e, 100, 238 256.

9 , ., , ., & , . (2009). 9 s s s . J a f Ne c , 22, 91 108.

9 , A., & s , . (2005). s ss : s . J a f Me a d La a e, 52, 205 225.

9 , . ., & 9 s, . (1995). ? s s s . J a f C e Ne c e ce, 7, 376 395.

9 , ., & 9 s, . (1993). : s ss s . J a f C e Ne c e ce, 5, 196 214.

, . ., & , . (2007) s s s s . B a d La a e, 100, 257 261.

, . ., , ., 9 , ., & , . . (2003). : A s s . B a d La a e, 85, 1 36.

9 , . (2007). s : s . B a Re ea c , 1146, 23 49.

9 , . ., , ., , ., , ., & , . (2006). s ss s , s s s . La a e a d C e P ce e, 21, 489 530.

9 , ., 9 , . A., , ., , ., & , . (2007). s s ss s s s: s . B a d La a e, 100, 223 238.

9 , . ., , ., , ., & , . (2003). s s ss s s s s . C e B a Re ea c , 17, 117 129.

9 , . ., , ., , ., & , . (2006). s s s s : s ss . J a f Ab a P c , 115, 251 265.

9 s, ., & , 9. . (2000). s s s . T e d C e Sc e ce, 4, 463 470.

9 s, ., & , . A. (1980). s s ss s : fl s . Sc e ce, 207, 203 205.

9 s, ., & 9 , . (1994). s s fi : s s . A. (.), Ha db f c c (. 83 143) , A: A ss.

, ., , ., , ., & , . (2006). s : s . J a f C e Ne c e ce, 10, 1774 1787.

, ., 9 s , ., & , . (2008). A s s fi : A s . B a Re ea c , 1228, 161 176.

, . ., 9 , ., & 9 s, . (1997). s s s . C e B a Re ea c , 5, 193 203.

, ., 9., & 9 s, . (1998). s . Na e, 395, 71 73.

, ., , ., & s, . (1997). s s s s s. J a f C e Ne c e ce, 9, 318 329.

, ., , ., ss, A., s , 9. ., & , . . (1991). s s ss ss s: s. J a f C e Ne c e ce, 3, 151 165.

, . ., & 9 , . A. (2005). s s s s : ss s s . C e B a Re ea c , 24, 691 701.

, . ., & 9 , . A. (2006). : 400 s s. J a f C e Ne c e ce, 18, 1098 1111.

, . ., & 9 , . A. (2008). s s s : s. B a d La a e, 106, 119 131.

s s, ., , ., , ., 9., , ., & ss , . (2007). s s: . Ne a e, 37, 361 378.

, ., & , A. . (2007). s s ss s s . H a B a Ma , 28, 585 592.

s , . (1997). s s s s: s ss s. B a d La a e, 59, 494 522.

s , ., & , . . (1992). s s . J a f Me a d La a e, 31, 785 806.

s , ., & , . A. (1995). s . J a f Me a d La a e, 34, 739 773.

s , ., & , . (1999). s ss, s s s s. La a e a d C e P ce e, 14, 283 317.

, A., & , . (2006). s s. P c , 43, 440 449.

, ., & , . (2007). s fl : ss fi s s ? J a f E e e a P c : Ge e a, 136, 485 501.

, ., , ., 9 , 9., & 9 , . (2008). s s s s . J a f C e Ne c e ce, 20, 2037 2057.

9 , . . A., , . ., & , . (1999). s ss : s. J a f Me a d La a e, 41, 147 182.

9 , . . A., , ., , ., & s , . (2003). s fl s s s . P c , 40, 235 248.

9 , ., , ., & , . (2006). s s s s s: fl s . J a f C e Ne c e ce, 18, 1181 1197.

9 , ., , . ., & , . (2005). A s 600 s s s . C e B a Re ea c , 22, 241 255.

9 , ., , ., , ., 9. ., s , ., & 9 s, . (1999). s : A s . J a f C e Ne c e ce S e e , 46.

9 ss s, . ., , ., & , . . (2006). : ss s s s s. B a Re ea c , 1106, 150 163.

9 ss s, . ., , ., & , . . (2007). s s s s : s . B ca P c , 75, 8 18.

9 ss s, . ., , . ., 9 , ., & , . (2008). : s s . Ne c a, 46, 967 982.

, . ., , . ., & 9 s, . (2004). A s : A s s s . J a f C e Ne c e ce, 16, 1272 1288.

, . ., & , 9. (2007). : s s s s . Ne c a, 45, 3001 3014.

, ., , ., , A. ., & , . (2006). s ss s s : s. B a Re ea c , 1071, 186 196.

, ., , ., & , . (2007). s ss s s s : A s . B a Re ea c , 1142, 135 145.

, ., & , . (2008). s s : s. B a Re ea c , 1203, 103 115.

, ., & , . (2009). ss . Ne c e ce & B be a Re e , 33, 1168 1177.

, ., & , . (2009). fl s s : . Ne a e, 48, 280 290.

, ., & , . (2008). s s s s . Ne e , 19, 745 749.