THE NINTH WHITE HOUSE PAPERS
Graduate Research in the Cognitive and Computing Sciences at Sussex

Editors:
Jason Noble & Sara R. Parsowith

CSRP 440

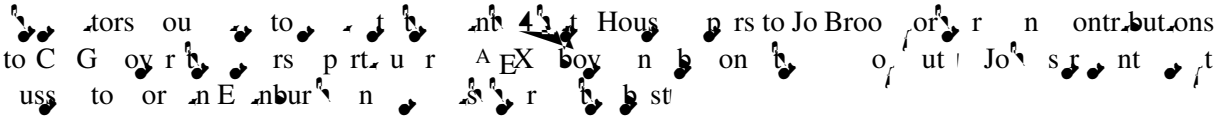
December 1996

ISSN 1350-3162

THE NINTH WHITE HOUSE PAPERS

Contents

Dedication



Preface

E r s n 9 C G r u t stu nts y b n t n t uss n y rs t s on r n ntr b 4 t Hous o t t Is o orns n r H r s H tu nts r v n t opportun t to y pr s nt t ons on r or n s n ost port nt so ut o s nnu y nt r s s o t on o s ort p rs t t y o to no n s 4 t Hous p rs s s t n nt t on

s su r post r u t stu nts tC G r nv t to sub t p rs o roun 2000 or s or n us on n t nt 4 t Hous p rs r su t n o t on r ts or n v rs r s o r s r su s rt y o n t y ps o o o p r s n o put r support oop r t y or o put r v s on y op nt ps o o vo ut on r o put t on t ps o o n u st s u t on p osop o s n n so t r s n

s r s or s op s or n s b r rso o s s to n t p n E n n Jo Broo o r boo y t r n or n rs r u n n nsur t t or s op s su ss tors ou to n D stu nts o ontr but or n t or s op boo nt tu st u t n n o s o un n s so to o Arv n t s or b n our u st sp r s r 4 r r t u to ro ssor t H nn ss n C G Gr u t s r C ntr or un n or s op

J son ob
r rso
D b r 99

It s o ut ost port n t r o n n nurtur o v r u n nt n s n o o n tons o v r u n nt n s 4 r so r nt r b us y r nt o n tons o nt n s I r o n t s I n y t st b tt r n o n ppropr t n n prob s t n or G r n r 9

n ts ton r ss s o n ton o nt n s n n n t no o s n to support I A r nu b r o o n tons o nt n s o ur ur n t y op nt o s s r or o o n s ton stu so o s o n tons on

2.1 Linguistic and interpersonal intelligences

n u st nt n r rs to n n v u s p t to us r rtt n or spo n n u t y s y o pr ss on n o un t on Int rp rson nt n r rs to p t to o un t ppropr t n t y n to r spon to o r p op n un rst n n r n s no o s v n qu t t y n t s or nst n n tron n roup r Group r n our s o b or tors t r nt o tons n t on s to o un t n s uss ssu s rou n u r s n r s r on o put r support o b or t y r t n n on o stu nts n r t qu t o u nts o b or t y

In u ton o b n ton o s nt n s sy r port nt stu nts n to o un t s s to r spon n to un rst n n s o p t nts so n to o un t t y n or o op r t y n r o u s n p t nts Int rp rson nt n s n so b o b n us n v su nt n s or p r nt y op nts n u o un t on v u o n v o on o put r s n

2.2 Musical and logical intelligences

us nt n r rs to b t to us n un rst n us n n n pr s on It b r s b st n n to v r t o soun s n b n n n n t v t s or b o pos n n on u t n us Bo nt n r rs to b t to us bo oy nts n pr s n s u nn r

s t o pro ss s r o b n n tr n n stu nts n nos s b us n u o

2.3 Spatial, kinaesthetic and logical intelligences

In ob J rso n E s 99 nd 4 t Hous p rs Gr u t
s r n t Co n.t.y n Co putn n s t uss Co n.t.y n s r
p r 440 oo o Co n.t.y n Co putn n s n.v rs.t o uss

The Developmental Prerequisites of Self-Presentation

Robin Banerjee
robinb@cogs.susx.ac.uk

School of Cognitive & Computing Sciences
University of Sussex
Brighton
BN1 9QH

Abstract pr s nt t on y rb n non y rb b v our nt n to ontro ot rs pr ss ons o t s s b n o us o u so ps oo r s r or s v r s Its ro n r n s so o n t.y y op nt o y r s b n r nor s uss on ons rs t y op nt pr r qu s t s o s pr s nt t on p tt nt on s p to y op nts n s r n ss t n r s n sop st t on o nt st un rst n n t n s n ot v t on nt r sts t tr r t s pr s nt t on pro ss s so port nt or so nt r t on n oo n u t oo

1 What is self-presentation?

st rt t b s pr s t t n n so nt r t on pr s nt ours y s n rt n t r o so ons ous or un ons ous Ho y r t on pt o s pr s nt t on b o s v uous us to oy r b v ours n so nt r t on A or n ost u t ors y t r n t ons o s pr s nt t on b p s s n t b s ot y o *attempting to control others' impressions of the self* B u st r 9 2, Go n 9 9

pr s nt t on ot y s n n st t s y s n v r t o s t rou sp t rou pr ss y tur s n stur s t rou t r sp s n t rou purpos y b v ours n r 9 ost o t st n so ps oo t r tur on s pr s nt t on n u ts s o us on y rb s pr s nt t ons or p oo n t s s r pt ons n o ob nt rv s Jon s G r n D v s 9 2 Ho y r t s r t t non y rb b v our pr ss on postur p n r n ot n t r poss ss ons tru st ts on or t s n qu port nt ns b tt pt to n pu t t pr ss ons ot rs y o us s n r 9 0 A o t s s pr s nt t ons ust obv ous b nt nt on but t or not b ons ous For p n uto t po t s tr r b boss s ov r us o b ot v t b s r to ony p rt u r pr ss on o t s to boss t t s nt nt on not y b n n ons ous r p ss t t o t t n Ab son s 9 or on s r pts n Go n s 9 9 or on ro s

B or ov on to t y op nt pr r qu s t s o s pr s nt t on t s ou b not t t s pr s nt t ons n not b pt y pr s nt t ons or not t urr nt or p us b s on pts o t 9 For p n r t y tr n to r t vour b pr ss on on ob nt rv r so t s pt y s bout ours y s but o t n s p on ntr t on s t y pro t n t s s b pos t y sp ts o our s on pts

2 Can children be self-presenters? Cognitive prerequisites

D sp t t v st t r tur on t ro o s pr s nt t on n u t so pro ss s tt tt nt on sh n p to y op nt or ns o s pr s nt t on It s s r t t pub o pro t s s o r t port n to pr o s nts n o s nts F n 9 n obs rv t on or su sts t y n n r rtn rs us pr t y y rs ons o u t or str t s to r p r pub t r b n r t z or r t n H t 9 In u n 9 on u ro s obs rv t on o s oo r n n t p roun t t r n ss st u ts p n s r t on r r put t on or pub n ortun t n u o pr nt stu s y ny st t v r ous sp ts o s pr s nt t on b v our n r n non sh n n or b b or t un rst n n o t pr r qu s t s o s pr s nt t on 4 st rt n s uss on o t o n t y pr r qu s t s o s pr s nt t on n t j s o s pr ss n nt st j un rst n n

2.1 Self-awareness

At t y r st s pr s nt r ust b r o t s s n t n n n n nt t st n t ro ob rs s s r n ss s t ou t b n to s o ts rst n t or o v su s r o n t on 4 or b s n Broo s Gunn 9 9 us n p oto r p s rror s n v o s su sts t t r o n t on o s rou t or u s st b n n ur n t or tur s o s pp rs n t s on r A so t s t nts b to r r to s y s b n n s n r st rt n to r t not ust upon t r p s r t r st s n t ons r I p but so on t r urr nt p r pt ons o n t ons n s n ot v t ons I s r I on t b y t t Br n nt to A I s I popp t I nn t n p Br t rton B 9 2, Dunn Bro n 99 , t 994

Furt r or s r n ro o r t r s on pts un r o s y r qu t t y s ts r s s r pt ons r r not ust to n ur n p s r t r st s n o nt r nt st j s but so to r u r t v t p tt rns n st b spos t ons Yu 99 p t to on y o s n t s s r port nt s n spos t on r t r st s or s sub t tt r o n s pr s nt t ons pr s nt n s on nt r n or n rous In p t t y op nt n s n ont nt o s s r pt ons b r t sso t s ts n n s o s pr s nt t on o s n r j b r n In s r y n t r s t h n tur o s on pt n ons qu nt t n tur o s pr s nt t ons s so s n b n s n ot v t on on rns s so o p r son pro ss s n r s n port n But r u z n 99

2.2 Understanding of mental states

In t on to v n p t to r t pr v j on s s pr s nt r ust un rst n t s s pub ob t t s p r y n v u t b o rs B s s b n b to r r on n ro n b s tt tu s s r s n ot ons 4 r o s s b to o nt on o rs nt st j s s Bro n 9 n 4 s 9 r port t t to rs r r n to bo t ro n n o rs nt nt ons n r s r on r n s t or o n n on n un rst n n o ot on s s o n t pr s oo rs r u r r r to o rs b s n ot ons s H rr s 9 9, rn r 99 us o s pr s nt t on ou pp r to r qu r n p t to ttr but nt st j s bo t to h s n to o rs or n ust un rst n o rs b s or v u t ons bout s r o n p s or ps o o r t r st s n ortun t tt s st t r s r s sp n n y op nt o p t to ttr but v u t ons o s to o rs Ho y r turn to our s n t r tur on r n s un rst n n o nt st j s n or r to or u t po s s bout n n o t s p t s to r An un rst n n o nt st j s s r r qu r nt or s pr s nt t on to b r o o on s v u t b o rs on ust b b to on y o nt st j s o o rs

s r on nt st j un rst n n s t n n n s F rst obs rv t on o n n

n tur s tt n s n t s t t r n b y s r o ot rs p t t ons nt nt ons n
ot ons For p 99 s r b s o n nts n b r rst r o r n ob t n
t n t s n n r t t us s n to b r t t n p on s p t t on r r
Dunn 99 r t s o t o ort n p n n o n b v our o n nts n b r s on r
s r spons y to ot rs nt st t s str ss o s tu s o y r ony rs t ons
y so onstr t t t r n n t r s on n t r r r t on t r o n n ot rs n
t st t s Br t rton B 9 2 o t n str t s p rt o us s n ust t ons or
tr ns r ss ons Dunn 9 F n or on pr t n n t s t t 2 r o s r p r t
p b o un rst n n n b v n n or n n r or o pr t n s t up b ot rs
Dunn D 9 4 s n o or prov s onv n n v n t oun nts y t st

no bout n to s ty to on t os n op o r not pr s nt n n to s ntro u su st n n r n ss o o no s t bout r t Fro t s t b on s st p to s ty pro t n r nt ts o t s to r nt n op A u un rst n n o s pr s nt t on o y r s to r on or sop st t nt st t un rst n n s s uss boy

3 Do children care about self-presentation? Motivational prerequisites

Ev n s o n t y p b o us n or un rst n n s pr s nt t on t t s s r n s to n r n or un rst n t *motivation* to ontro ot rs pr ss ons o t s In ot r or s t us n un rst n n o s pr s nt t on pr su on rn bout so v u t on A t ou t r r to b n v u r n s n t nt o t s on rn Buss s 9 or on pub s ons ousn ss, Gr no on uss

But r u n 99 A n so a t on ts on t y op nt o so o p r son ot y s n nor t y b t ss ss nt n bbut n urb n r n *Child Development, 64* 2 4

Dunn J 9 *The Beginnings of Social Understanding* B or

Dunn J 99 b n n u n s In s E n n E s *Social Influences and Socialization in Infancy* pp 9 09 nu r ss Yor

Dunn J Bro n J 99 t ons ps t bout n s n t y op nt o t r u t on n r oo In G rb r J Do A E s *The Development of Emotion Regulation and Dysregulation* pp 9 0 C br n y rs t r ss C br

Dunn J D 9 4 I D 2 r o s o bor t on n o nt pr t n t s b n n t ot r In Br t rton I E *Symbolic Play: The Development of Social Understanding* pp A r ss r n o F

F n G A 9 Fr n s pr ss on n nt n pr o s nt b v or In H n G E *Childhood Socialization* pp 209 2 A n Gru t r Y

Go n E 9 9 *The Presentation of Self in Everyday Life* Doub An or Boo s Yor

Gott n J r urst J 994 A y op nt b or o r n s p n qu nt n s p pro ss s In Co ns A E *Minnesota Symposium on Child Psychology, Vol. 13, Development of Cognition, Affect, and Social Relations* r n Er b u H s J

Gr no 4 G op C uss r ut ns r G J 9 on tor n n r n A nt ppro to so y op nt *Developmental Psychology, 23*

H rr s 9 9 *Children and Emotion: The Development of Psychological Understanding* B or

H rt r 9 D y op nt p rsp t y s on s s st In H t r n ton E E *Handbook of Child Psychology, Vol. 4, Socialization, Personality, and Social Development* pp 2 Yor 4

H rt r 9 D y op nt pro ss s n onstru t on o t s In Y D Jo nson J E E s *Integrative Processes and Socialization: Early to Middle Childhood* pp 4 r n Er b u H s J

H t J A 9 I pr ss on n nt n n r rt n ssroo s An n s s o r n s or n p r nt r t ons *Anthropology and Education Quarterly, 18* 0

Jon s E E G r n J D v s E 9 2 o t r n nts o r t ons to b n pprov or s pprov s p rson *Psychological Monographs, 76* 2 4 o no 2

99 Jo s n s C r n s un rst n n o nt nt on s oo In 4 t n A E *Natural Theories of Mind* pp 9 4 B or

s Broo s Gunn J 9 9 *Social Cognition and the Acquisition of Self* nu r ss Yor

s u v n 4 t n r C 4 ss 9 9 y op nt n s ons ous ot ons *Child Development, 60* 4

rn r J 99 *Understanding the Representational Mind* I r ss C br A

rn r J 99 b n r pr s nt n t s tr b t n b n s r n r n s , or o n In Fr D oor C E s *Children's Theories of Mind: Mental States and Social Understanding* pp 9 r n Er b u H s J

I-366.966(l)-7.8234(177(y)-4.10691TJ-270.48-13.45.64366(o)-4.1097(n)-2.69781(h)-4.11026(i))5.64311(a)5.64422(s)

H p C G 9 b or t n s In *Aspects of Scientific Explanation and Other*

In ob J rso n E s 99 nn 4 t Hous n rs Gr u t
s r n Co n.t.y n Co put.n n s t uss Co n.t.y n s r
n r 440 oo o Co n.t.y n Co put.n n s n.y rs.t o uss

Health Anxieties and the "Worried Well": Locating and Defining an Elusive Population

Kate Cavanagh
katecav@cogs.susx.ac.uk

School of Cognitive & Computing Sciences
University of Sussex
Brighton
BN1 9QH

Abstract t r ts sso t n s r.ous n ss t n tur ob t o r o
r nt t r tur s o us upon 4 orr 4 t r ost r nt us to r r to

popu t on su n nt t sts s qu st on b us t turn to pr v ous popu t ons pr s nt n on rns bout sp n ss n or r to s rt n n ppropr t ours o r s r n t s r

8 Parallels between the worried well and syphilophobics

os st n o to b sb n r n s p p ob s t os pr s nt n on rns bout s p s n pp n n r 9 9, uor o t 990 p op ob s rst r port n t r tur n t n Ap n 9 n b o on o p nt ur n t t n 9t ntur B ur 9 s r t s n pr s nt t on b t n t os b s p op ob n t os ons r n o r s b t n s p s n HI AID n t r s o o s o tr ns ss on n r t r t on b st s n u n on t n p r o n n st o p s n nt t r or t on n u t t b n b r n A t on s r t s b t n on ptu t on o t s p ss s n t u tur s n t ros t b not

9 The cultural values, illness and the media

o r n t 0 s s p s n HI y b n sso t so or st s n r su t nt b n o v t D or n n u 99 , H r 990 u r 99 ts o HI n AID sso t n or t t n t n p ss F rs o ont on r t n b p u t p ors us ont 990 n s p s AID s b o t ont por r t p or or orrupt on n n nt stru t y onsu t v En o 9 4 s po r u r t r t on r t b nt rpr t t on n pub tt nt on n n r or o o n nt r ous n u tur v u s o r t rb t on rns bout n ss HI n AID y r y ov r o n unp r nt ns t n stor o s s D y n Gr n 99 4 st t pro ot on t n qu s y un oubt b pos t y p t n t r s o urb tr ns ss on r t s or HI t p t o t s p ns on t os n v u s pr spos or sus pt b to ss v on rns bout n ss s b n n t n r s r In r s s n pr s nt t on n on rns bout HI n AID o o n p t p ns s not surpr s n Ho y r s n n s n t t t r s b n tt n r s n t os t st n HI pos t y B t 990 t n t t p ns y p so ro n pr p t n rr t on rs n t t r s r r ou b p t ro so p r o us nto t s poss b t

10 Conclusion

ur un rst n n o rs bout n ss n n r n HI n AID n p rt u r s r ro o p t It ou s n r t y t t pt t or t stru tur or su on rns s out n n or r to t po r u p r r s r Cons r b r s r s n n or r to s rt n t

on C 9 A not on tub r u r p ob *The medical fortnightly, 39* 2

o pson C 9 s u o AID AID p n or AID p ob 2 *British Journal of Psychiatry, 151*

J A 94 2 st u s tur osop ob *Journal of Mental Science, 94*

ovs s 4 r H C 9 orb pr o up t ons t n t n r ssur n A o n t y b v our ppro to po on r s s *Behavioural Research and Therapy, 24* 9 02

nb r r 4 J 9 9 A tor ny st t on o so b or t st n t ons b t n n t n u t n s *Studies in Psychology and Psychiatry, Catholic University of America, 10* 4

ont 990 *AIDS and its metaphors* n u n on on

tr r 9 p ss rs A n st t on o n t r t nt rv Bu t n 9 99

u D H 92 *A dictionary of psychological medicine* C ur on on

uor o A A r E t n n 990 E t s s o p t nts n un oun r o AID *International Journal of Psychiatry in Medicine, 20* 40 4

4 r H C 9 9 A o n t y b v our ppro to po on r s s n t n t *Journal of Psychosomatic Research, 33* 0

4 r H C ovs s 990 H po on r s s *Behaviour Research and Therapy, 28* 0

4 n ss s E on 9 AID p n *British Journal of Psychiatry, 150* 2 2

Zubro s 9 2 Cu tur o pon nts n r spons to p n *Journal of Social Issues, 8* 0

2 ALife as a tool for theoretical biology.

Co p o put r s u t ons o not n n s n b t s y s n n s t r t n qu prov n s o o n n st n s n In s o A r ssu s t t s s n s t or t b o o n I not r u t t or t o nt

As n n t n qu t r s s op o r so v n o ontrov rs s ov r ssu s t y on r n t b tt roun o sput s t n or p o Z no s r o n t ny nt on o u us o n n t s r s s or not pp n n t s o A but n s o t pp n n r n s un ss n ppropr t t o o o o s n or t s t s st rt n po nt or t s n t on ust b n un rst n n o n r r t r o t s n s n qu st on s s s not n ss r b o p t b v n n un rst n n o t s s n s r tu pr t s n our p rt u r t s

A or n to r

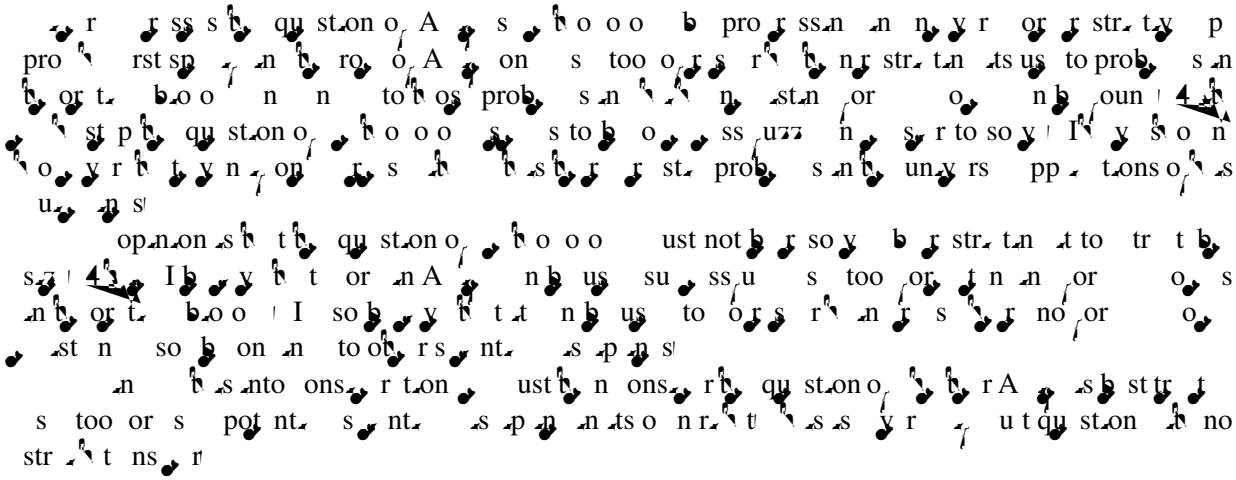
A po r u o us n A s u t ons s to t n st n or o ro t or t b o o n r t ssu pt ons pr r b op t t t t r r qu r to t s tr t b r 99

r s tt oubt t su t o t n to nr urr nt o s n t or t b o o n p ns rs too r or y n poss b to ob t n n t Ho y r or o t n t n not t s s t o t n to r t A or n o t t o o o n p osop ssu pt ons o t os s t or t o s s ou not b u o prob n pr n n

n t s t on pts su s tn ss n pt t on r n y r qu st on nt n nv ron nt
r s p r t b n s t tt r b n o u or st t n tur

Conjecture: A n o put r s u t on t n qu s n n r prop r pp y b
pot nt or r so v n s nt t st so o t

4 Conclusions: looking for a starting point.

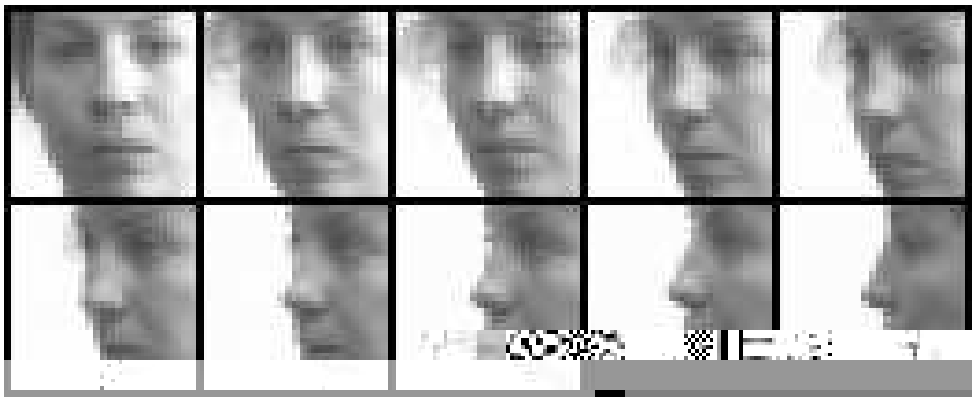


Font n [illegible] r G Buss [illegible] 994 B on t n tur s *Artificial Life* pp 2 22

Fr n E 990 D t n s *Physica D 45* 2 4 2 0

Goo n B C 994

Fro n rsp t v n rv 2 t s t n t nput y t



F ur Ent r rn rot t n roun y s or on p rson b or pr pro ssn

output un t *i* h output s

$$o_i(l) = \sum_h w_{ih} o_h(l). \qquad 2$$

4 3 st h ts w_{ih} n b ust usn h 4 ro Ho 4 ro Ho 9 t rn n ru h sn r o n r output un ts p r ts tr ps u o ny rs t o o o G ros 99 or h r t u t on h tt r ppro o s ost nst nt p ous tr n n o p t or r r ss o s 2 h BF p t or s su ss n ppro t n non n r u t ns on un t ons s p n nt on su nt n un ts b n us n h su t b t o h ntr s str but on oy r h nput y tor sp C n Co n Gr nt 99

2.1 'Face unit' RBF model

For h o o n t sts t o t p s o p t or r us st n r BF o n un t BF o st n r p t or s tr n t poss b ss s ro h t h nn r t s output str t st h un t p t or pro u s pos t y s n on or h p rt u r p rson t s tr n to r o n z For n v u un t BF p t or n b tr n to s r n t b t n t p rson n o rs s t ro h t s t us n pro n nt v n or n nst h n v u D t s n b oun n Ho Bu ton 99 A h ou t s s on ppro n r s s o p t h sp tt n o h tr n n or n v u ss s nto s p r t n t or s y s o u r stru tur t n pot nt support r nu b rs o ss s sn p t or s z n tr n n t s or h st n r o qu b o pr t s h nu b r o ss s n r s s

3 Form of test data

n t n o t on or h tr n n t st s n h s n t stu s sb n pt r on o 202 J2 4 9 n 20 t 9 4 4 9 s srt n 4 4 r 42 s 4 2 4 4422 4 4 2 n 4 4 0 2 n 4 0 2 4 09 4 9

a st nu b r o nt n un ts sts r on r n o n t or s s ro to 2
r t y 2 9 n 2 n t or s

F ur 2 **Shift-varying** t or n on v o on n v u top t b top r t nor v botto t botto r t

F ur **Scale-varying** t or n on v o on n v u 2 us s × n o 2 0 × 0 nor v 00× 00 2 94×94 2 × ×

- A s v r n t s t n y op s o on t st n r s p n n o s z n our r s t ± 2. n ±2 o ts sur r r n n ro × to × s F ur

5.1 Inherent invariance - training with original images only

s p r nts us on t or n ro roup o y or tr n n us n t v r op s n t r n r o b or n on s not us or tr n n or t st n s y s sur o t ntr ns nv r n o t p t or to s t n s *ie.* nv r n not y op ur n tr n n b posur to p s o o t t v r s

t or	r pro ssn	In t	D s r	A t r D s r
t n r 00 400	DoG	4	4	2
	G bor		2	4
0 20 F nt	DoG		0	
	G bor			2

b 2 E t o pr pro ssn n o s on **shift-varying** t s t b or n ro roup o y us or tr n n

t or	r pro ssn	In t	D s r	A t r D s r
t n r 00 400	DoG			
	G bor		4	9
0 20 F nt	DoG	9	40	9
	G bor			

b E t o pr pro ssn n o s on **scale-varying** t s t b or n ro roup o y us or tr n n

5.2 Learnt invariance - training with shift and scale varying images

s p r nts n us s t on o pos t ons or tr n n p s us n y y rs ons o or n l s y s b n t or n or t on bout b s t n s v r n ur n tr n n to p n rm n t s n o nv r n

t or	r pro ss n	In t	D s r	A t r D s r
t n r	DoG	2	**4**	**94**

7 Conclusion/future work

4 ro B Ho 9 A pt y s t n r u ts In *1960 IRE WESCON Convention Record*
o 4 pp 9 4 I E Yor

In ob J rso E s 99 nd 4 t Hous p rs Gr u
s r n Co n t y n Co putn s t uss Co n t y n s r
p r 440 oo o Co n t y n Co putn s n y rs t o uss

You'll Never Walk Alone in Vygotsky's Zone

Rosemary Luckin
rosel@cogs.susx.ac.uk

School of Cognitive & Computing Sciences
University of Sussex
Brighton
BN1 9QH

Abstract t t o r s p p r p s z s t n or o bor t on b t n t or b n s ss b p rtn r n rn r t ons p s to r t n nt n Zon o ro D y op nt Z D I orr t onstru t ur n nstru t on nt r t on y n t r t nt r t on s s b o bor tors ou b nv s b pr s nt s p r n t rn r s p r or n p to us n not on o Z D n so t r s n s to ny st t o t o put r n p r or t ro o t or b p rtn r n o bor t y r t ons p s p p r oo s t p t ons o us n t Z D s b s s or so t r s n p rt u r r n to prob s nvo y n qu nt n n ust n ss st n o r to us r n pro ss o prov n o bor t y support

1 What Vygotsky wrote about the ZPD

r r t o pr s nt t ons o Z D v b n En s tr ns t on E t s s t r nt ppro n p s s rst sour s ou t n n u 9 ntro u t on o t on pt o Z D r s s t n ont t o n ny st t on nto s r or or n pot s s to p n t y op nt o s nt on pts n oo In p rt u r ots s on rm n r t on o r t ons p sts b t n nstru t on n nt y op nt An r ots s s p rt u r tt nt on s t sur nt o s nt y op nt r v ous t s b n on n t r s o t s b t to so y st n r z prob s un ss st Ho y r ots su sts t t s t o on sur s b o p t p rt o t s y op nt n t t s s not o stor Z D s pr s nt s n ss ss nt tr s p to ss ss s pot nt t rou r o bor t y p r or n p b t s oppos to r n v u p r or n b t s on p r ots s uss s Z D s n n n o t 9 H r on pt o Z D s ntro u s r spons to qu st ons bout n tur o r t ons p b t n rn n n y op nt n s t s oo In or r to un rst n r t ons p b t n rn n n y op nt t s nsu nt to t r p s n y op nt y r pr s nt n y op nt n t s r t n p u ss p n s upon t t r n t on o t st t o y op nt y s n t on to tu y op nt y t y n tt n ss st n ust b nt Z D p s nt un t ons t t y not t tur In or r to un rst n s nt y op nt t s ss nt to nt n t o y s t tu y op nt y n t zon o pro y op nt ots 9 r t on o Z D s ss nt tur o rn n t ns nt rn y op nt pro ss s n on op r t n t s nt r t n A un nt port nt sp t o t Z D ro bot y rs ons s t n ss st or o bor t on or ss st n ro not r or b p rtn r Ho y r r s no t ount o t or n t s ss st n s ou t

D nt p r nts t p o nt o s o onstr t on n nt s s so t run t rou n nt r onstr t on n s t n r n to r p t t ot rs

4 References

B ss J As n r 99 E t y n n rn n o n v s t *Oxford review of Education, Vol. 22 (No1)* pp

Bro n J Co ns A n Du u 9 9 tu t Co n t on n Cu tur o rn n *Educational Researcher* J n F b 9 9

rp G G or 9 *Rousing Minds to Life: teaching, learning and schooling in social context.* C

H r 99 *Situated Learning and Cognition - Theoretical Learning and Cognition* pr s nt t n 2n Con r n or o o Cu tur s r G n v

y J 4 n r E 99 *Situated Learning: Legitimate Peripheral Participation.* C br n y rs t r ss Yor

y J 9 *Cognition in Practice: Mind, mathematics, and culture in everyday life.* C br n y rs t r ss Yor

urp 99 *Proactive Adjusting to the Zone of Proximal Development: Learner and Teacher Strategies.* r s nt t n 2n Con r n or o o Cu tur s r G n v

or n D A op r r J C 99 rn r C ntr E u t on *Communications of the ACM, Vol. 39* o 4

ots 9 *Mind in Society: The Development of Higher Psychological Processes.* H rv r n y rs t r ss C br ss

ots 9 *Thought and Language.* I pr ss C br ss

4 rts J 9 4 *Culture, Communication and Cognition: Vygotskian Perspectives.* C br n y rs t r ss C br

4 oo D Brun r J n oss G 9 o o utor n n rob o v n *Journal of Child Psychology and Psychiatry, Vol. 17* pp 9

4 oo D bo t t H 4 oo H n s t 99 *PerchoConpUn18.68-13.6801Td(e)5.6431*

In ob J rso .n E s 99 nn 4 t Hous p rs Gr u t
s r n Co n.t.y n Co put.n n s t uss Co n.t.y n s r
p r 440 oo o Co n.t.y n Co put.n n s n.y rs.t o uss

Automatic Acquisition of the Argument Structure and Semantic Preferences of Verbs.

Diana McCarthy
dianam@cogs.susx.ac.uk

School of Cognitive & Computing Sciences
University of Sussex
Brighton
BN1 9QH

Abstract An port nt sp t o y rb ntr on rns b stru tur n s nt r t ons ps b t n y rb n ts r u nts s n u s b sur s nt t pr s s on o r u nts t rn t ons b t n n s pr ss ons n s nt pr r n s b t n

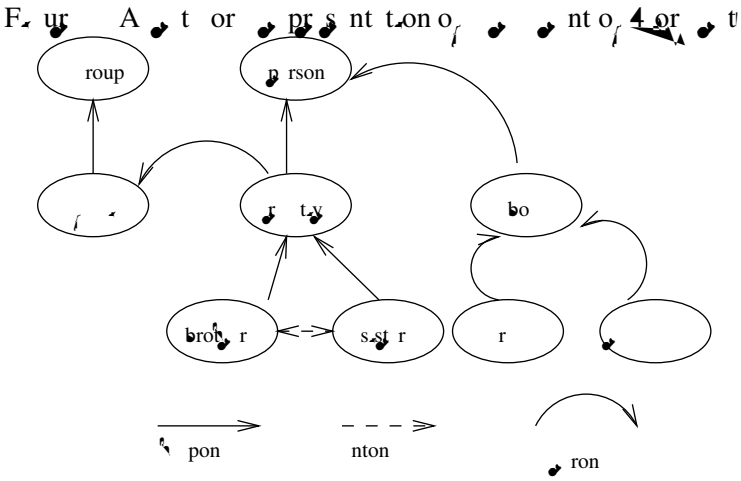
s n or t on s r qu r b n tur n u pro ss n s st s n or r to vo spur ous un r t p rs s

D s s t rn t ons r r u r v r t ons n s sur pr ss ons o r u nts For p y rb y n t rn t b t n t o sub t or z t on r s p n 2A n 2B s s no n s t y t rn t on n o urs or y rbs s r n pproprn t s nt o po nts su s y rbs o v n y o n n s ry n os pr ss n nst nt ous us o b st ot on b s ur n ro v n 99

2A Jo n y bo to o

2B Jo n y o bo

s t rn t ons prov us u or n z t on n or


roup
rson
bo
r t y
brob r
s st r
r
pon
nton
ron

st s nt nt rpr t tons t y stron sso tons b t n pr t n r u nt r pr rr t s st poss b to o nt rpr t tons t y r sso tons us n p 4 t ou t sso ton o t y rb rob t t FI A CIA I I I s ns o b n s stron st t s not n on v b to t n o v b s tu ton su s r t s st n r p nt sp s ro t s o r y r In t s r t r n tr n to n t t s nt tur s r qu r b r u nts o y rbs I s nst us st t st sur o sso ton to st t t pr r n o y rbs or p rt u r r u nts

It ou b n un n b t s to tr n stor sso tons b t n y rbs n t n v u or s o urr n n r u nt pos tons n on o r o n r t on b n n or s I s us t or ss s prov b t s nt r pr s nt t on s r b boy or r s b s t o bot sn n b s sn 99 b s 99 n t t I s prob b us n

4 Diathesis alternations

r su ts o bo sub t or t on r n s t on r str t on qu st on r p nn to prov
b b s s or r v n b s t o b s s t rn t ons v b to y rbs b or b t s b n p r
or on tr t n b s s t rn t ons s b n on b o p r or nu o s 994
or s uto t us n Ds n ppo 994 o no b on ob r r s r r o
s tt pt to t b s s t rn t ons uto t ro n tur o urr n t t s sn sn
99 H oo s t b s t o p t ob t t rn t ons r b r t ob t n b ropp n
En s or p

5A Jo t b s n

5B Jo t

H s ppro r sts on b ssu pt on b t ob ts r ropp r b r or s n r b
ro t y rb For p b ob t o t y rb t s or s n r b t n b t o n
H pr su s t t str n t o t s t on onstr nt o y rb or ts r t ob t n t
p rt p t on n b s ob t rop t rn t on o sur b s str n t b us s b sso t on sur
s r b n qu t on on p b t n y rbs n b r r t ob ts r ob t n us n t
nn r b n p rs s ntor n 99 ntor n 99 b r su ts r pro s n but b r r
v nt prob s n sour o rror s t t o rron ou

References

B s z n r 99 H r r ust r n o v rbs In Bo ur v B ust ovs J E s *The Acquisition of Lexical Knowledge from Text. SIGLEX ACL Workshop* pp Co u bus o

Br s o C rro J 99 Auto t tr t on o sub t or z t on ro orpor ot t pub s

Co J Gub r J A Gub r 992 s

s Y 9 An nt nt n r n un rst n r o n s In Gros B p r Jon s
bb r B E s *Readings in Natural Language Processing* pp 2 4 2 4 or n u nn
r n pp r n CAC

Y ro s D 992 4 or s ns s b u t on us n st t st o s o o t s t or s tr n
on r orpor In *Proceedings of the 14th International Conference of Computational Linguistics. COLING-92* o II pp 4 4 0

Z rn 99 Intro u t on In Z rn E *Lexical Acquisition : Exploiting On-Line Resources to Build a Lexicon.* r n Er b u Asso t s H s J

- r r portn s n

v st or t o n s n s r o ntr r port so n bout nt rn st t o s n r A r ss y or t rr tor s n s n s u sp s r r v n n or t on or s n or t on bout s n n n u stu b n on o r n s v n n or t on bout nv ron nt

n r n H rp r n t s uss pro ss b r b t o s n s nt n G t or su sts t s n s ust b o so b n t to s n r or not t st rt I s n n pu t s b v our o o rs to v nt o s n r n t *signaller's* b v our b s t or but t bout b v our o r v rs 2 4 3 o p n tt nt on to s n t s ry s to t v nt o 2 4 3 t stops

ontinu to trust b s n n on run t p s or b to o so b us b r r ots o on st
y rs ons o t s n roun As n r n H rp r put t r r ot or or s t n
n r s ur s us s on st b n E un r b r t r u st n s

F n b r r o n to b s tu t ons su s b p o s t b r b s r un r pr ssur
to t n r t b r qu t n y pr su b tr v r ous p o s n s ort uts ov r vo
ut on r t but b r o ours o vo v n b t s o r un r y n r t r pr ssur
not to t oo Hon st too n b n E

6 A biologically informed methodology for artificial life

I on t t s obv ous ro s t on t b o or t b o o ont ns u o v u to n
A stu o b vo ut on o o un t on r 99 s r u stron t or n b o
r t b o o n r t s s b st st rt n po nt or t os o s to o o un t on
n ot r b o o p no n *in silico*

Bur r t G 9 D n n o un t on In Jo nston Jr J ou ton D G ur A
E s *Communication by Chemical Signals* App ton C ntur Cro ts Yor

C o s 9 *Language and Mind* H r ourt Br n or Yor

C o s 9 *Reflections on Language* n on Boo s Yor

2 Intra-group collaboration

C rt s n on 99 th t oop r t y or n s bot v nt ous n u t, o or n s v nt ous st pro ss n p b t so roup r r t r n t to n v u s n t r r n n r s nu b r o v po nts n s s Ho y r t pr s n o u t p v po nts ns t t s n ss r to o or n t h s v r n p t t ons n v s 4 h n h ont t o oop r t y or n t s h r or pro u t y to ons r o to u us o h n r s op n ons n b t s v b to roup b rs At t s t h s ou so nvo y n s n h prob s o o or n t n ont t v t n t su ss u o bor t on

2.1 Common ground

As pr v ous nt on o un t n n v u s o to roup n s t o y rs not ons n s t t n to vo y nto y op s r p rsp t y or su ss u o bor t on B obt n n o on roun roup b rs r b to nt p t h b s n t ons o h r o or rs n turn un t ons to u o oop r t y or C r n r 9 9 ons r o on roun to b h utu no b s n ssu pt ons b roup b rs s not on s on m n h t o or or p op r t h r o on b roun n p r n s to or o pos t un rst n n o h b s b o rs Co on roun s pp r nt n n v u s un rst n h r n v s b o rs n n r n pos t on to r p n r o n not ons n t t o p pr s nt p rsp t y s In v u s r st b to o y r nt v s Ho y r t r b n on o n y op n or no o o on un rst n n s b t n roup s o

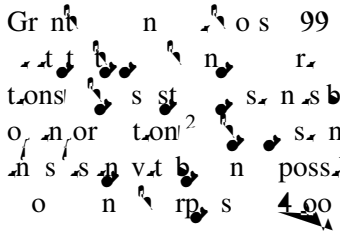
2.2 Breakdowns

H v n ss rt t t n v u s y obt n s r un rst n n t s p ss r to n ns t nto h s r n bout t nt r pr s nt t ons n o n t y st t s o os t o p op E st rbroo 994 us s t b t n op rt p nt s p t t ons n t t ons o not r n b u to n rror o o un t on or o p r pt on b r p rt u br o ns n so o ur u to r n o un rst n n o t s tu t on For p r 990 po nts out t on us on o t n r s s b us t s or s nt r nt n s to r nt p op Br o ns h r or or n v u s to ons r p t t pr v ous b n ssu t t h s r n un rst n n o t s tu t on E st rbroo 994 n n t sun rst n n s r s n us br o n n o un t on n to ntr roup on t

2.3 Conflicts

Con t s o t n nt n t n p t ons o nn n or os n In roup s tu t on r on t o urs p rt p nts n to oy ro s n o r s oppon nts to or n to o h bn s o bor tor 4 4 09 4 900 n p 4 2 2 9 o to n 4 09 4

4.1 The Coordinator



r o n n n r or b p r y s spr o n or t on t r qu r s t on r n ss tur s to support s n ronous o bor t y or

r r r nu b r o s st s s n or s n ronous o bor t y or r st n on b A oo p s b B s upport or Coop r t y or B C4 s r n or t on s st s B nt Busb 99 B C4 s st s nt r t nto t st n stru tur o t or sp n b ss r t t o on bro s rs Ho v r s pr v ous s uss s n ronous o bor t on s not on u y to pro ot n r n ss o o or rs or n n b s us rs to s t t on r us rs r o n n n b s t on urr nt o t n o s n not s v n b b p r pt on t t r or n n b s roo Gr n r t s 992

D 99 po nts out t t s r su ss u pp t on n t t s port nt not to os s su ss H n r r t n s n o p t n s st t s s ns b to r y op t ns ons to n or r to o o t n s o s n ronous o bor t on bro s rs r not p t or sp n t us or oo b s s or str but nt r or n t on or n A so r s op ous ount o n or t on v b on n t n s r n o str but n or t on r t y s p r s r t ss o us rs D 99 n t s port nt to r t ons to b to support roup or n r r t n r s n n r su ss u pp t on s s support b Gru n 994 o su sts t t r s n to n orpor t st n tur s o s n us r pp t ons nto C C4 pp t ons n or r to t v n t o us r r t t t s p rt u r sp ts

5.2 Systems on the WWW for synchronous collaboration

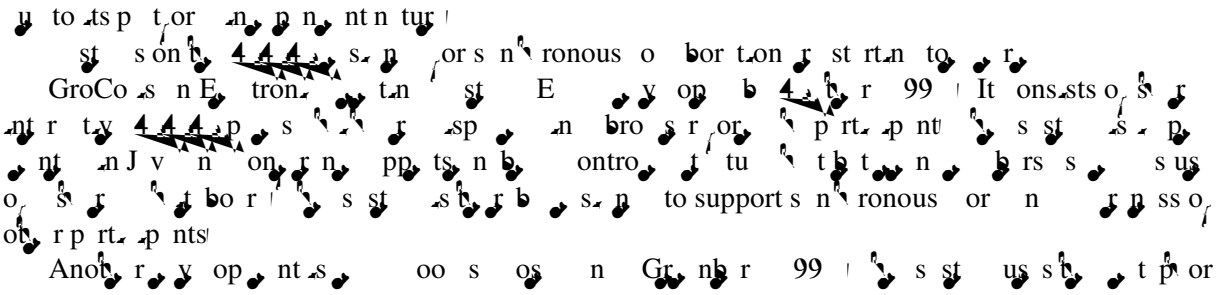
r r s y r s st s r un t on n on n t to support s n ronous o bor t on H r s br ov rv o so o t s

Fr vo n n Fon 994 y o b n n s n ronous ss to n or t on o r b t n t s n ronous on r n n too C E Co bor t y u t n Env ron nt no o r r t on s t t su o b n t on n b s us rs not on to bro s t rou t o st t n or t on but so to ont t u ors n s uss s n or t on t s n tur t ns on o bro s n pro ss r su t s r t on o s r or sp t t p r ts us rs to t to o r s s n nt r t t o r s pp t ons s st s n p o o to su ss u br t p t n s n ronous n s n ronous t o s o or n

os s n o ns n n 4 no r 99 y ntro u t on pt o A s s o Ap prov s s n r r v o s n r t qu o n s r n or t on s r b s b n sour o t n or t on s n t nvo v s r t n o u nt ont n n r t n t t s r b s not r o u nt s r o nts ons qu nt b o v b on n t n ons prov n to n H p t nnot t on t t s s st s t us oo p o o r n ss tur s n b n orpor t nto C C4 s st , t prov s ss to n on o n stor o o bor t y y op n or t on

A n D ou nt o ro o 99 p r ts s v r us rs o t on r nt t s to o on r t n pro u o u nts n stru tur It ss ns us rs t r nt ro s su s t r r ro p r ts r on ss o o u nt n r t r o s o t on o r nt s us r n y r nt ro s on r nt r nts s st ts t t s ou b poss b to p r t or n ss to y n o u nt s n ss r s nsur s t t o bor t n roups n y r o pr v n or n

In v rsson 99 s uss s o J v n p n t y ro n t n n t n or s n ronous o bor t on J v n t s n to s n n or t on ro n nt to t s r y r or nt r t on to nsu J v n u s so su 4 09 4 9 404 09 4 t 24 0



E s C A G bbs J n G 99 Group r o

4 no r 9 A n u t on p rsp t v on t s n o oop r t v or *Human Computer Interaction 3*

4 no r F or s F 9 *Understanding Computers and Cognition* Ab or oo

Appendix: Preliminary Design Plans

Aim

o ut 4 4 4 t ns ons to support t pro ss s un r n s n ronous o bor t v r t n p r t u r br nstor n t v t s n to pro ot r n ss n s r un rst n n s on st us rs

Features

o o n tur s b p nt

- s st b 4 4 4 b s
- pro r n b n J v
- upport or br nstor n b prov
- s st y bu t n r n ss t s
- r t n o o u nts b support
- 4 t bo r t s b p nt
- t ony rs t ons b support
- Con urr nt v n o H o u nts b poss b
- o o un t on Bon b n orpor t
- ur t ons prov un nt t on o us rs n r str t ss to o u nts

Requirements

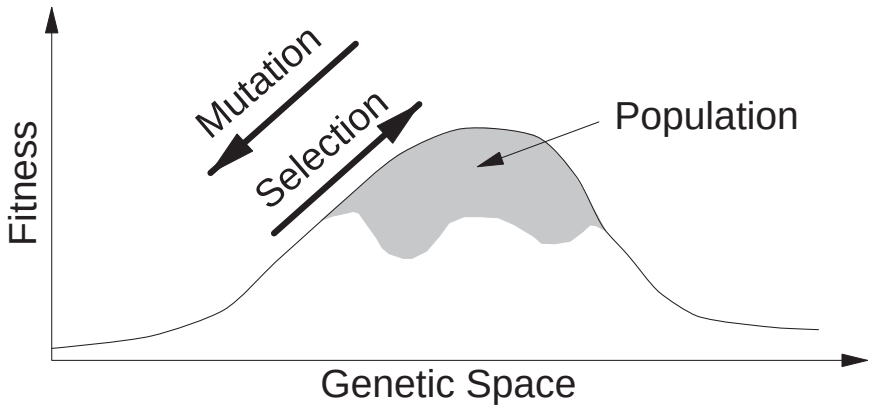
- o ut or n
- br nstor n
- r n ss
- tt n
- on urr nt o u nt v n
- v o on r n n

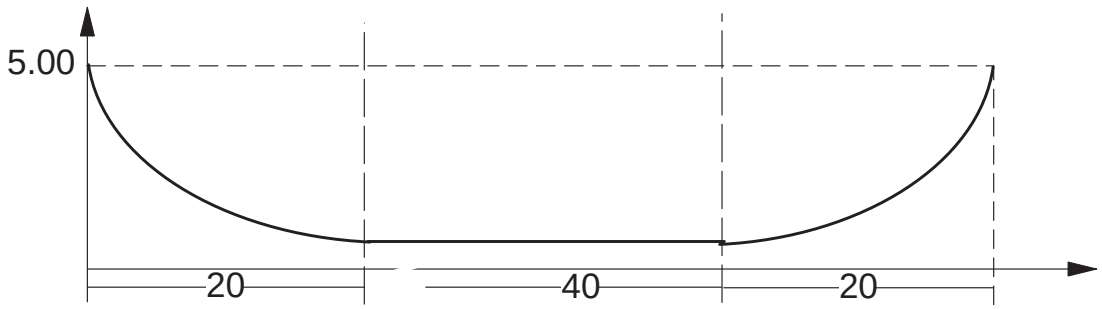
Users

- D str but roups o r o ut or n r tt n o u nts bot n n n n ustr

Strategy

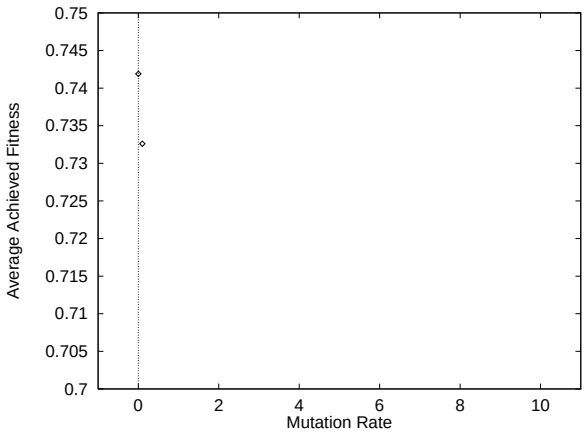
A br ppro b t n us r b s n so t r n n r n o s o s n b t n n t protot p nn ustrs

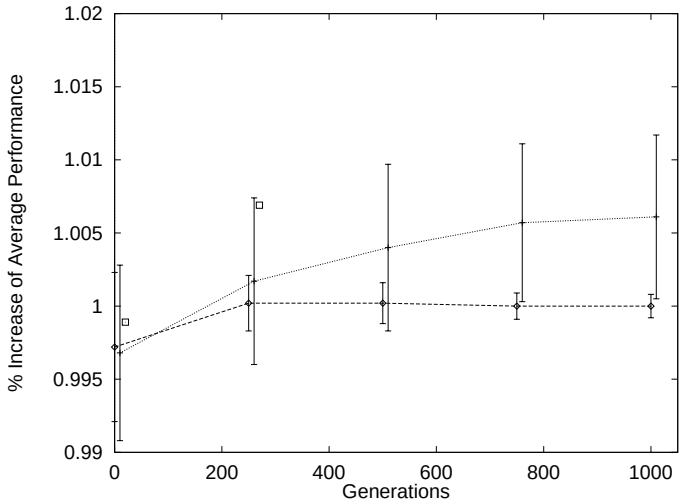

Fitness
Mutation
Selection
Population
Genetic Space

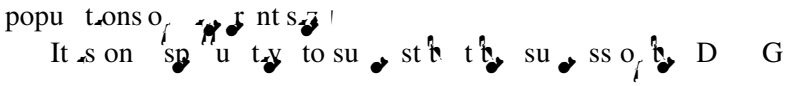

5.00
20
40
20

5.3.3 The leave phase

[illegible] **last_success** [illegible] In [illegible] [illegible] **mutation_rate** [illegible] **last_success** [illegible] [illegible] **mutation**


0.75
0.745
0.74
0.735
0.73
0.725
0.72
0.715
0.71
0.705
0.7
Average Achieved Fitness
0
2
4
6
8
10
Mutation Rate


1.02
1.015
1.01
1.005
1
0.995
0.99
% Increase of Average Performance
0
200
400
600
800
1000
Generations


popu t ons o r nt s
It s on sp u t y to su st t su ss o
D
G

2.1 From spaces to surfaces—invariants

C ss p r pt on h or s b s on h o sp p r pt on, G bson o us s on t port n o *surfaces* H r u s t v s on t s p n h ont t o n nv ro

oor n ▂ ▂n n b p r▂ ▂ t r o onst nt▂ ▂ t F▂tn ss ▂s ▂ n ▂n t r s o t▂ pro
port▂on o t▂ ▂ t▂ robot sn n s ▂n t▂ ▂ ntr o t▂ r n ▂ robot▂ s t o ▂ ▂ s ▂ ▂ sn ▂

5 Conclusion

[illegible]

References

Brooks, R. A. (1991). Intelligence without reason. In *Proceedings of the Twelfth International Joint Conference on Artificial Intelligence*.

Brooks, R. A. (1991b). Intelligence without representation. *Artificial Intelligence 47* (1–3).

Cliff, D., Harvey, I., Husbands, P. (1992). An investigation of evolved sensor motor controllers for autonomous vehicles. In *From Animals to Animats 2: Proceedings of the Second International Conference on Simulation of Adaptive Behavior*.

Dyer, G. (1991). *Ecological Learning Theory*. Routledge, London.

Gibson, J. J. (1966). The senses considered as perceptual systems. In Brunswick, J. E. (Ed.), *Perceving, Acting and Knowing: Toward an Ecological Psychology*. Lawrence Erlbaum Associates, Hillsdale, NJ.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. Houghton Mifflin, Boston, MA.

Harvey, I., Husbands, P., Cliff, D. (1994). Seeing the light: artificial evolution, real vision. In *From Animals to Animats 3: Proceedings of the Third International Conference on Simulation of Adaptive Behavior*.

Marr, D. (1982). *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*. W. H. Freeman and Company, New York.

Dennett, J. (1994). Consciousness explained: precis. *Philosophical Quarterly 44* (181), 181–200.

Krebs, J. R., Davies, N. B. (1991). *Behavioural Ecology: an Evolutionary Approach (3rd edition)*. Blackwell Scientific Publications, Oxford.

Lutoslawski, C. (1914). *The Origin and Growth of Plato's Logic*. Longmans, Green and Co., London.

Prescott, T. J., Gurney, K., Humphries, M. D., Redgrave, P. (2000). A robot model of the basal ganglia: behavior and intrinsic processing. *Neural Networks 13* (8–9), 935–953.

Stephens, D. W., Krebs, J. R. (1986). *Foraging Theory*. Princeton University Press, Princeton, NJ.

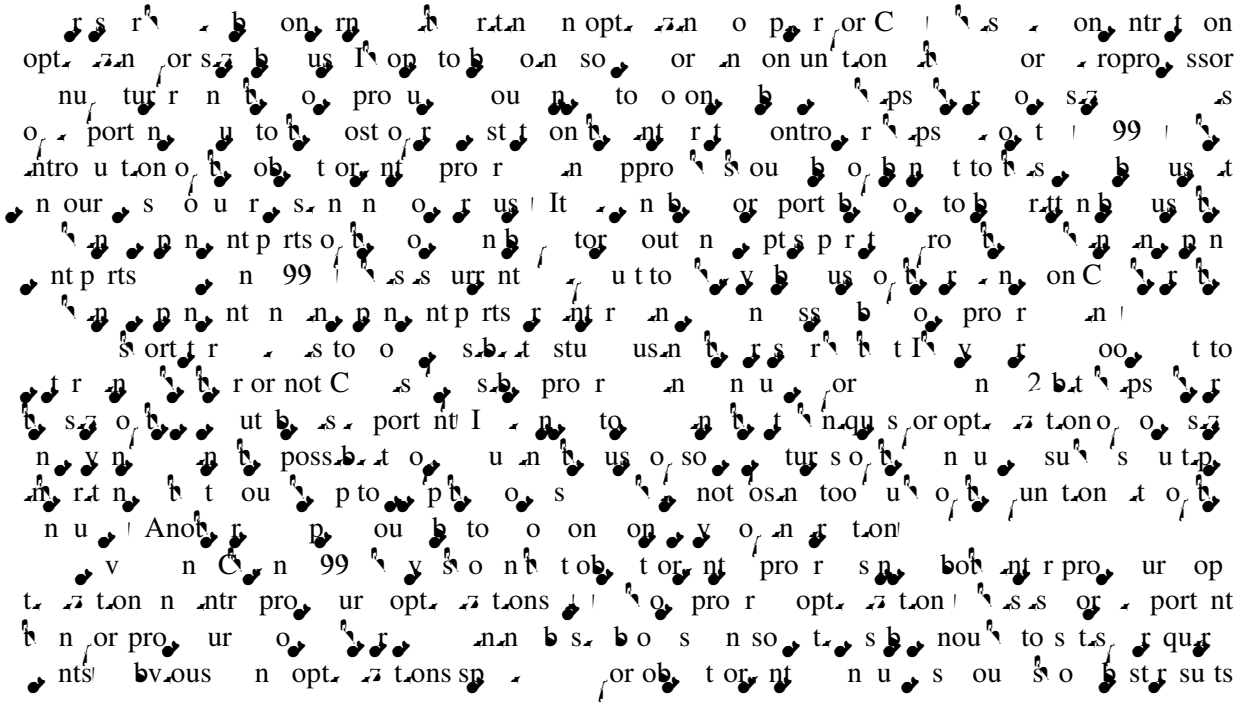
2 Virtual functions

2.1 Introduction to virtual functions

t v rtu t b s or sub ss s o ss E t o n b pp to v rtu t b o s t
t o p t At runt b s n r t t rou t po nt r t t pproprı t o s t
u t n r t n r qu r s s t or o p t s n not r r o n r t on v n
r n n 994
In n opt n o p r t on t to v rtu un t on n n r t nt o

3.2 Dynamic analysis

4.2 Overall view



C r B Grun D 994 u n n t un t

In ob J rso n I E s 99 n 4 t Hous p rs Gr u t
s r n Co n t y n Co put n n s t uss Co n t y n s r
p r 440 oo o Co n t y n Co put n n s n y rs t o uss

How Do I Check My Software Designs?

Joseph A. Wood
joew@cogs.susx.ac.uk

School of Cognitive & Computing Sciences
University of Sussex
Brighton
BN1 9QH

Abstract v n so t r s ns s bo *hard, error* prob n or uto t n
s prob s o t n t b u t n v r ous tr s r t n to o u r stru tur
n p rt u r o s on n oup n 4 pr s nt nov ppro b s on st t st ust r
n s s s s ustr t b oo n t so t r s n or s t o tr ts t
ross ro s

1 Introduction

o rn so t r s st s r y r r n o p s s o un r s o p rson rs o ort r not
un o on 4 n to n n ontro t nt r t ons o ur n su s st s t s n b
y v o u r onstru t on

o u s n b n or t on n n n u un nt nt r t ons b t n o pon nts
or ov r su n ppro s p s t prob b br n t prob nto s r sub prob s
o u s so s t prob s o n n t pro u t on pro ss b nt n r qu r o pon nts
s so ps b o n s nt t on o t s n s not b n o p t

4 so no ro p r stu s t t h ost o orr t n so t r prob s t n s to r s b t
st n or r o n tu s pro r ss on t pro u t on pro ss r or r p rt u r
nt r st n t r st s su s r qu r nt ptur sp t on n s n

4 r nt r st n t t r p rt o t o p t s n n t o p t s st s v b or
ons r t on

2 The problem

tr t on t o o n so t r s ns st t nst n n ustr s s r s o s n
r v s D s n r v s y s y r s v nt s

- H r or ,
- qu r s s bour,
- Error prop ,
- onsu n ,
- r p ns y ,
- Fr qu nt s o

upport b CA E r ro En n r n n s n s s r Coun n sso t on n Br t s
o bor tor s 4 4

ot surpr n nu r o r s r rs r n to n s to us o put rs n uto t t
n qu s to r v u n nvo y nt

An ob v ous rst qu st on nvo y s o s n s pr s nt s n t s r t s n s on
b u pr nt o so t n s o n to b bu t

oo n t urr nt b st pr t prov s on t u n r s sp tru o no
t t ons r n n ro t t to n tur n u v r n r s o r p
support t t s n b u t to un rst n n r t v n ns y to us su t t t s b st

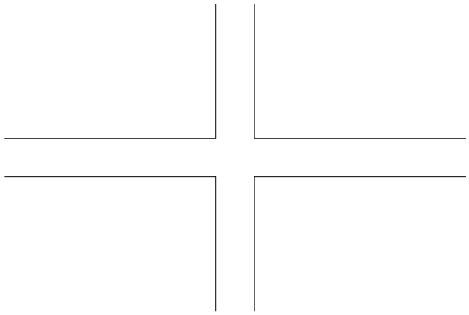
- 4 *t work?*

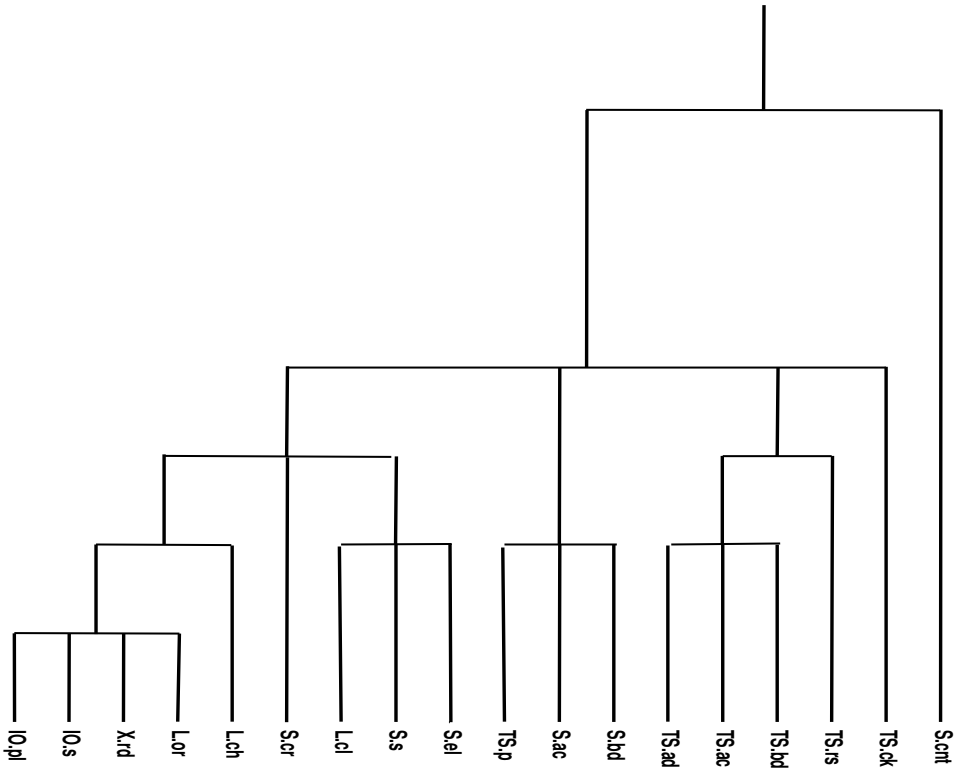
o o t s qu st ons n b ns r b o p r t n too s but so r y r r prob s y n or u ns

n ppro opt b s y r r s r rs ours y s n u s to y op sur s o t s n s stru tur n *hope* t t s sur s ptur nt n b prop rt s o t s n su s o p t un rst n b t n s o o t on t

or ob tons to t s ppro o o ro t obv ous poss b t o us n s r sur s to ptur r nt prop rt s n urb r s ou on tr b oo pr tor o s y r r nt prop rt s? A t on t nt n b n tur o t s prop rt s s t poss b to n t on sur u ob tons r o ours v n us or on rn Ho y r t r s p r bus t or o p s n b o s t ss ttr t v t b o s s b u to b n r r to un rst n n n bu t

t o ost o on prop rt s oo or r o s on n oup n *Cohesion* sur s o n ob t s s n n ss o purpos t s on s n n purpos to y r p rt o t ob t ontr but s *Coupling* sur s o nt r n n nt t o ob ts r ot surpr s n ou s st to y stron o s on n oos oup n It s r t n so s ns t s t o prop rt s r os r t but t s r ro obv ous t t t s r tons p s Cons r or p s n ob t nt t so y o o pos t on As s n ob t t s ou y o s on ts p rts ontr but to but s n purpos o o pos t ob t nto s t o pon nt ob ts t s ust y oos oup n n t st ontr but to s n purpos





F ur C ust r n s s o tr un t on s n

b t n s n o pon nts r t r t n b n n ss r pr or
us o ust r n s s or n n so t r s ns s unusu s or p n
B 99 n Hut ns n B s 99 n B 99 r nt r st n b or n t on
o pro r s s r o y r n B n r or b r n s s t b sour o y not b
s n y

References

Hut ns D H B s 99 st stru tur n s s C ust r n t b n n s
In pp r J E *Software Engineering Metrics, Volume 1: Measures and Validations*
Gr H nt rn t on s r s n so t r n n r n p pp 9 Gr H Boo
Co p n r n En n pr nt ro IEEE r ns t ons on o t En n r n
, 49 9

B 99 D t n ps *Software Maintenance: Research and Practice 5*
4

ob nson J 992 *HOOD: Hierarchical Object-Oriented Design* r nt H ob t or nt
s r s r nt H H H pst En n