, n ro on

Gu t s an p r n . t at ars s n o at nor s or a u st at ons r portant or a p n a ron so on os , n ar a out Gu t s ons r a qu nt ss nt a ora ot on as t pa s a ru . a ro n ot at n a r n . to so .a nor s an pro ot n on . at on a t r nt rp rsona on t Za n a r an o . ans a Bau st r t a Ho an an n t a oo an Cos s n . r as an H pa . It s a so a or atur o s ra portant . n a on t ons nt on an a a . o u t s a . ntra atur o ps . opat an sasso .at t ant so .a , a or n t a Bar nt ot r an pr ss on su . a at on an ot r nt rna n sor rs ar asso .at t . ss u t an s orn t a at . n rstan n o t , ran r pr s nts t s o p ora ot on . an t n n or t op nt o trans at ona app at ons to . n a s tt n s Hu s ta E ot on t or sts a propos t at u t ars s ro a part u ar t p o o n t appra sa t at n .u ss ra nts t r o n t ont at on sa t ons or na t on s .aus n su rn a at on or nt at on t t su rn ot r an attr ut on o , a or r spons , t to on s Fr a Bau st r t a C an an t A t ou appra sa t or su sts t at u t ars s ro a un qu st o appra sa s t pot nt a a un qu onst at on o , ran n r nts oors t a su . patt rns n not n . s sar , app to , ran atur s n a ons st nt a a ross nstan . s o u t an a ross n ua s Barr tt an atput us t r ans un . ar as to t r t r s a r a , s natur asso .at t t s part u ar on urat on o t ou ts an , s an t r su . pro . ss s a ons s t nt , ran r spons s a ross n ua s an tas s B n a , to nt su . sta , s natur o u t ou n or us a , out o s ar or ss ar t n ura pro . ss s r at to u t ar to t os un r n ot r a t stat s sa n ss r r t t . In a t on nt n sta , u t r at , ran s natur G B ou , an portant st p to ar un rstan n t un t on an s un t on o t un r n , ran . r u tr n a t an . n a popu at ons oo t a or . nt n uro a n stu s a an pu at u t n nt rp rsona nt ra t ons , an pu at n t t o u t r at appra sa s p r . pt on o ot rs su r n an t no t at on sa t ons a aus t at su r n o an t a Yu t a s stu s a s o nt at , ot atur s ar t r nants o s r port u t , ut not ot r ot ons o an t a an ons st nt oun t at t ar asso .at t n r as a t at on o ant r or . n u at ort ACC a CC an , at ra ant r or nsu a AI Ho r t un ar at ana s s a opt n t s stu s ar not su . nt to pro a , ran s natur o u t F rst t un ar at approa . s s a . s n o t ats o ss n ant r n . n a t at on str n t a ross r nt ps . o o a stat s r n . s n ps . o o a stat s o r a not , n o n t a t at on str n t o an s n o rat r t a , n o , st n t patt rns o a t at on a ross a ar nu , r o o s or t o , ran on t un ar at ana s s s n to t st or non ro orr at ons , t n ps . o o a stat s an , ran asur s , ut not to st at pr t a ura . t s o t nt , ran orr at s For a p a t ou , ot Yu t a an o an t a r port t a t at on o t a CC an AI n r at to u or o u t on t ons t a t at on n a . stu annot , us to pr t p r nta on t ons n t ot r stu r n r n t u t to on . u t r t a t at ons n t t o stu s ar r a , s ar

H r a r ss t s op n qu st ons an op a n u rop s o o a s natur o u t r at o n t appra sa s o , . ar o not tr at t s natur as *the* n . ssar an su . nt n urop s o o a on t ons or u t na ptur n a an on n urop s o o a stat s asso .at t u t Ho r t s st us u as a pro s ona ar r t at on rs n or at on a u as as a n , ran asur or pro s ona n r n . o par sons an urt r t st n an a at on on t , ran , as s o so .a o r t s H r a

na sa p tota o N= a nor a or orr t to nor a s onan non r port an stor o ps . atr .or n uro o a sor rs A part .pants pro n or ons nt, or s ann n an r pa or t r part .pat on

ro ur

Bot tu an tu a opt an nt ra t para r a part .pant n t s ann r an a part .pant outs t s ann r p r or a ot st at on tas t at n o st at n t nu , r o ots ,r pr s nt on a s r n or s ar nt ra t para s s a t a Cu t a pron t a sta s n t ot st at on tas ou r sut n t out o s ann r part .pant r a t r part n r r . n pa u st u Ess nt a , ot stu s an pu at part .pants r spons , t or t ar to t partn r In tu F A part .pants un r nt t o un . tona a n t .r sonan . a n I s ann n , o .s In t rst , o . a n , o . part .pants r to t att partn r on rat ou r . tr .s o .s t r t partn r t part .pant or ,ot a a sta n a ot st at on tas s a o us to an pu at n r as n s o u t t so u t p t n r a sta o urr an artn r spons , an Bot spons , an t ost u t n t part .pant , ut not t partn r r spon n orr t a n spons , n t tra s r t partn r ou r . tr .s o .s t part .pants r n t opt on to nt r n an , ar a proport on o pa n or t partn r In t s on , o . o a n , o . t part .pants r to t att ou nt ra t t t sa partn rs n ana ost nt a tas t t . pt on t at no pa n st u at on as r to t rs o a n , o . as n .u as a u t r ontro or ps . o o a pro .ss n o orr t n orr t , a . an t pro .ss o a n so .a o par sons o par n on s o n pr or an . t t partn rs pr or an .

In tu F B part .pants p a a s ar ot st at on tas In a t rnat n , o .s t part .pant n t s ann r a , o . too turns t an a tua r n o ass stuat outs t s ann r , s r , o . to pr or t ot st at on tas Bot r n s ou n po nts or orr t r spons s an os po nts at r on rt nto , onus on or rron ous n orr t r spons s a , t r p a r a or , s r on t on Cru .a t part .pant outs t s ann r ou r . a t ona pa n u at st u at on on a ran o s t a o t rror tra s an nonpa n u ar t st u at on on t ot r a o t rror tra s an r n or nt partn r as r . n pa n s r sut n a , a tor a s n t t r s o F , a . Corr t Error ar t an Error a n an t o s o A n . a s , s r It as p t t att on t on n . t part .pant ns t s ann r a aus pa n to a r n , a n an rror a Error a n ou a to t st s o u t

ost an an pu at on C E ot on ports

A t r s ann n an ot on an pu at on . . as po n , ot stu s In tu part .pants rat t r n s o u t ar an r an str ss or a . o t p r nta on t ons n . an n orr t r spons o urr In tu part .pants rat t r n s o u t ar an r s a an sa n ss or a . o t p r nta on t ons

uro a n Data A qu s t on

For tu a s r a qur us n a s a o , o s ann r ro I ns Gr an * t un t ona a s r a qur n a a s . s para to t AC C n t no nt rs . ap a or n u , ran o ra I a s r a qur us n an E I pu s s qu n . t a o s a E o s a pan o ° an F o × an × × o s A r so ut on o , ra n str uctura s an × × sotrop . o as a qur a t r un t ona a n For tu a s r a qur us n anot r s a o , o s ann r ro I ns Gr an * t E I s qu n . D E r p tt on t = s .o t = s pan = ° × × o s or a qu st on o un t ona a s o t o , ran s . s str uctura a o a . part .pant as r or t a t AGE s qu n . r p tt on t = s n rs on t = s .o t = s × × o s

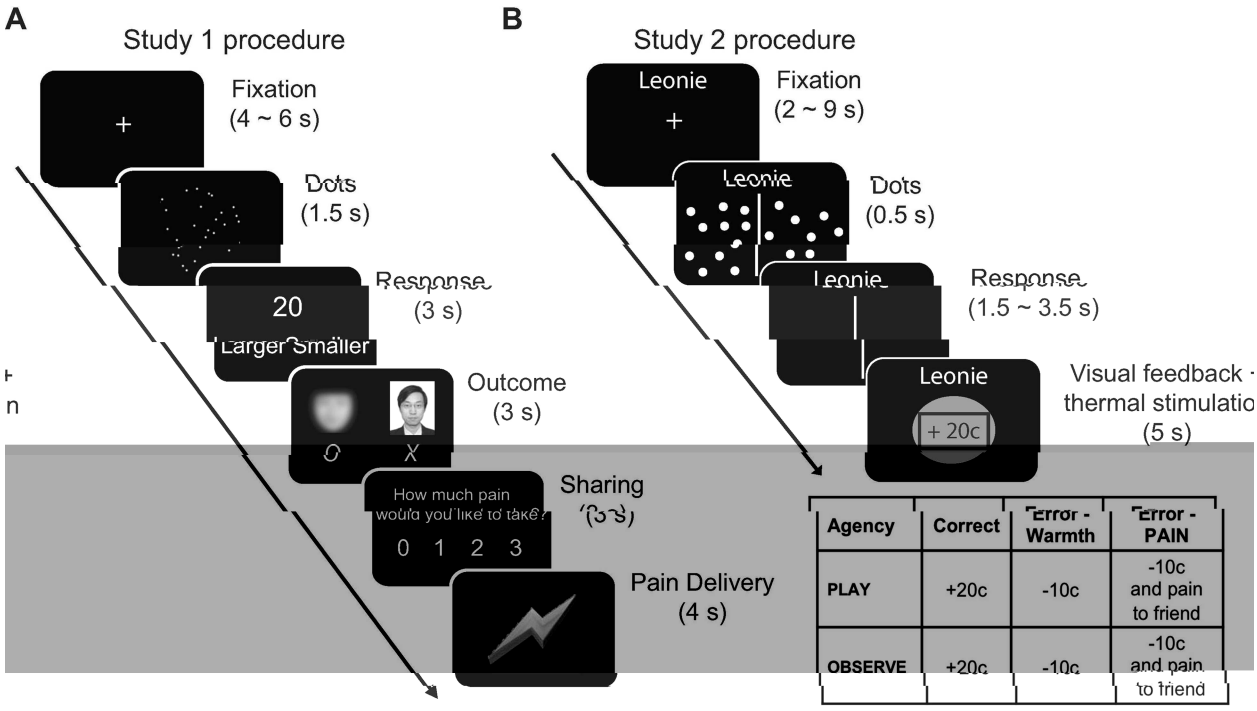
uro a n Data Ana ys s

Preprocessing and Univariate GLM Analyses

D ta s o pr pro .ss n ar s r, s r Yu ta or tu o, an ta or tu In , r un ar at n ra n ar o G ana s s r on u t n For , ot stu s t r t ra r ssors r t os orr spon n to t , a . o t sua tas For tu tra s ro t a n , o . an t o a n , o . r o ns parat G s Ea . o ontai n as r t ra r ssors t o o n on tons a o t H F start n at t ons to t , a . o t ot st at on tas an o r n t nt r , a . p as urat on= s t on t on n . t part .pant a on a a ron r spons an spons , t on t on n . , ot p a rs a a ron r spons an Bot spons , t on t on n . t partn r a on a a ron r spons an artn r spons , an t on t on n . , ot p a rs a a orr t r spons an Bot Corr t A so n .u r r r ssors o no nt r st u or n tra ran o ot pr s ntat on st at on r spons s o p nsat on r spons s an pa n r t ast t o r on n .u or t a n , o . For tu t r ant r r ssors orr spon to t , a . nt s p r nta on t ons Error a n Error ar t an Corr t n , ot t a on t on an t , s r on t on ontrast a s orr spon n to t a n ts o t s r r ssors rsus , as n r tra t an us or tra n n an t st nt u t ar at patt rn ana ss

Guilt Pattern Classification

tra n a n ar s a . para t r C= as . os n *a priori* to s r nat a n spons , u t o as nt .ass at on rsus a n Bot spons , u u t o as nt .ass at on on tons n tu t a a on su , t out ross a at on pro . ur Fr an t a a r t a oo t a rat ona o tra n n t .ass r to s r nat t s t o on tons s to a o as u . as poss , t .ass r ptur n pro .ss s t atar not ss nt a or t t n u t For a p a .ass r tra n to s r nat t a n spons , an t a n artn r spons , on tons ou not on ptur t r spons , t o t part .pant n aus n pa n , ut ou a so ptur r n .s nt out o , a . o part .pants



F ur ro. ur or tu an tu A In tu t part.pant nt s.ann r as ran o par t an anon ous partn r on a. tra tas or t part.pant an t partn r as to qu. st at t nu , ro ots pr s nt , r ont s r n out o o t r p r or an. as pr s nt un r t p oto o t part.pant an un ra , urr p tur o a. r pr s ntn t partn r I at ast on o t st at n orr t t partn r ou r. a nu , ro pa nu tr.s o.s part.pant t n n at t o pa n s ou , n to ta ort partn r as a o p nsat on F na t pa nst uat on o t part.pants. o. as r to r s Yu ta or ta s B In tu t o part.pants too turns n t r p r or n or o, s r n t ot rs p r or an. na ot st at on tas ot st at on tas r qur t pa r to n at . s o t s r n ontain a ar r nu , ro ots part.pant outs t s.ann n roo ou r. t r pa nu or nonpa nu ar t r a st uat on a tra. tra p n n on t p r or an. o t urr nt pa r u × a tor a s n r sut n ro t r nt , a. t p n t t o tas on tons pa n or o, s r n s sp a nt ta, s o, an ta or ta s

p r or an. orr t s n orr t Int stat st a arn n t ratur Fr an t a t r ar an t p s o. as s at on a or t s , utt n ra p r or r s ar on pro, s su. as t on pursu r a or t s su. as t on us n t s stu ar t ost us a or t or t o. o. as at on an ar ro, ust an r asona, sta, n t pr s n. o no s atur s E por n r nt a or t s ou , n t r st n , ut a a to an op n n ar t o o o a pursu tt at s not p t to pa t p r or an. n a r pro u., or s st at. a n t pr s nt atas ts In a t on ant to a o t trap o ttn u t p a or t s an p. n t , st on t us o r ttn t atas t r or . os a us a or t o as os t n ss as, n sta, s n pr ous stu s at a, o s an I a s n or tra n n t . ass r o put n patt rn pr ss on an t st n n ra a, t ar a a a, at ttps t u, o an a,

a sus nt s ana ss r t o , ra na t at on aps as , an *a priori* ta ana t. apasso. at t t tr E ot on ro uros nt un or t t st ap t r s o at P_{FD} < a. ss as o pt , r s upp ntar F ur or ta s Yar on ta s as as. os n to s t o s t at ar pr su a, por tant or ot ona pro. ss n n t , ra n a. no t at ot ons ar r nt pro. ss s ro nt ra t ons , t n an , ra n r ons . r r n qu st ta ssoa pot nt a n. u n t os outs t p a o t on , ra n r ons a ptur , t s uros nt as Ho r t r s a tra o , t n ons r n a poss , atur s o s an n ra a, t o t . ass r a p. up on no s ns ons t at o not n ra to n atas ts us t o o o a rat ona o app n t E ot on as , or . ass r tra n n as atur s t on an ns on r u t on t t a o r as n o r ttn an o n r as n n ra a, t assu t at at ou tu an tu n u. u t t s t r nt nt ra t tas s t or un r n ot ona pro. ss s ou o rap ra n n an t st n t . ass r t nt ot on as ou r u. t poss , t o o r ttn an t r or n r as t n ra a, t o t . ass r to t t st atas t Futur r s ar. t ar r sa p s s ou n st at t ro o ot r ar as n t , ra n an us n st ross a at on or opt n atur s t on an t tra o t n ra a, t pro. ur tra ns t . ass r on part.pants an n rat s a t ap t at , st . ass s t sa p an t sts t . ass t on on t t out t part.pant s pro. ss s r p at unt a part.pants a s r ast t st sa p or t . ass t on a or t a t on . to o, ta n t r r sp t ross a at s natur r spons a u s . ass ro, ta n t us r pr s nts a p rp an n t atur

spa . t at, st s parat t o,s r atons n ua ,ran a t at on aps nt an spons, on ton an t an Bot spons, on ton

Guilt Pattern Expression

ontrast a s ro t rst ana ss or a. par t .pant r us to o,ta n patt rn pr sson a us or t u tpatt rn oo,ta ns n patt rn pr sson a us or a. on ton an a. part .pant o put t otpro u t o t ross a at t apo t u tpatt rn an t n ua ontrast a s s a ur sts t stan . , t n a n a t at on apan t .ass rr pr s nt , a pr pan nt atur spa . s patt rn pr sson a us r t nt st or r n .s , t n p r nta on tons a u at t or . . o . .ass at on a ura . or o t t o on tons n qu st ons r orr t .ass , as on t r patt rn pr sson a us As nst an n ra a, patt rn or nt rp rsona u t s ou , not on a, to s r nat t an spons, rsus an Bot spons, on . t .ass r astra n , ut a so to s parat t an spons, an ot r ss u t on tons n tu an artn r spons, an an Bot Corr t as as r nt u tstat s n tu A tona t patt rn pr sson a us or t on tons nt an, o . o tu r r r ss a anstt n n sst o a . ptt partn rs pa n nr sp t on tons to ass sst r a, t npr t n u t n u . o p nsat on, a or Int r r ss on o on ton as n .u as a u ara, to o ara t out t ara, t o o p nsat on as a un t on o on tons

For sp . .t t pr t po ro t nt rp rsona u t patt rn s ou not n ra to ot r t p so n at a t ot stt sp . .t o t u tpatt rn o,ta n n ua a t at on aps or unp asant p r n .s ot r t an nt rp r sona u t n .u n p s a pa n an ar ous pa n tu N rs nan ta an ot on r a tu N a n r ta tu atas t ontan t r s ts o aps orr spon n to t r s o t r a pan u an o app on t o ar sur a . o t t or ar an t r s ts o aps orr spon n to n t r s o unp asant a s u an o ot on r a atas t ontan s ts o aps orr spon n to part .pants r a o p rsona or so past p r n .so u t sa n ss an s a

Comparison with Other Brain Signatures

o n st at t spata s art o t u ts natur t ot r patt rns as , t sa E ot on ta ana t . ap ast G B a u at t spata s art arson orr at on o . nt , t nt G B an s natur s or p s a pa n a r t a p tur n u . n at a t I E C an t a so .a r t on oo t a ar ous pa n rs nan ta pat . str ss an pat .. ar As ar t a an s n on u tan . an art rat E s n,art t a

Furt r n st at t o a patt rn s art o t G BD an t I E t nt ta ana t .E ot on as an t nt t r anon a ot on r at , ran r ons ACC nsu a an a a a us n an . s att r p ots o,an t a to sua t a ount o s ar post s ar n at an un qu post an n at o ts ort os natur s z s or to a t o para, nt os ar as As s r, n ta , or o,an t a a . o s ts ort t os natur s r p ott ont x an y a s r sp t an t s s att r p ot ast n nto t s tors o tants r t n r nt r tons o s ar an un qu ts or a . patt rn o s n tant a post ts or t G B , ut n ar ro ts or t I E o s n tant a post ts or , ot patt rns r t n s ar ar an . o s n tant a post ts or t I E , ut n ar ro ts or t G B an so on o quant nu , ro o s an t r o , n ts n a . o tant o put t su o squar stan . s ro t or n

B av ora su ts

upp ntar a, su ar st , a ora r su ts o tu s a so Yu t a Ess nt a part .pants t t st o u t nt an spons, on ton ss so nt an Bot spons, on ton an st ss nt an artn r spons, on ton F P< spatt rn as a so o,s r or t a ount o pan st u at on t part .pants . os to , ar or t partn r F P< an t p r . r spons, t n aus n t pan st u at on F P< ost o . t sts s o t ata o par sons, t n on tons , t s n ant r n . or a t t r asur s Ps<

upp ntar a, su ar st , a ora r su ts o tu s a so o,an t a ost s ans r port u t , ut not ot r ot ons as r or t a Error an on ton t an t , s r Error an on ton ar s Bon rron orr t o par sons t s n t sts Z P In part u ar t ot on s a . r qu nt oo ur an s as on us t u t n r a usa Boon n F ss r s o a sso .a, patt rn n r spons to our an pu at on p . a s r port u t as s n ant r t an s r port s a n t a Error an on ton an r n . ± P Bon rron orr t or u t p o par sons , ut not n t , s r Error an on ton an r n . ± P as support , as n ant E ot on t p u t s s a , on ton a Error an s , s r Error an nt ra t on F P a nto t r t s r ports r su ts on r our pot ss t at on s o n r spons, t n aus n ar to ot rs s a ru .a o n t pro .ss or ant . nt un r n u t Furt r ta s r ar n , a ora r su ts an , oun n Yu t a an o,an t a

uro a n su ts

Testing the Sensitivity and Generalizability of the GRBS

o t r n t r t r s a u t ar at patt rn t at an st n us , t n t so .a s tuat on r t part .pants r so r spons, or ot rs ar u t stat an t s tuat on r t r ss aus a r spons, o u t stat tra n a ar to s r nat t an spons, on ton an t an Bot spons, on ton t a a on su , t out ross a at on Fr an t a r ason o . oos n t s t o on tons or t o par son s t at tru s out pot nt a onta nat on , t , a . o part .pants o n

ab A t ations nt t r s o G B ap

ons	H a z a u	Cust r s o s	I oor nat s		
			x	y	z
os t ts					
a CC					
Insu a			–		–
In r or ronta *pars obitalis*					–
at ts					
In r or t pora ort				–	–
a a us				–	
C r u			–	–	–

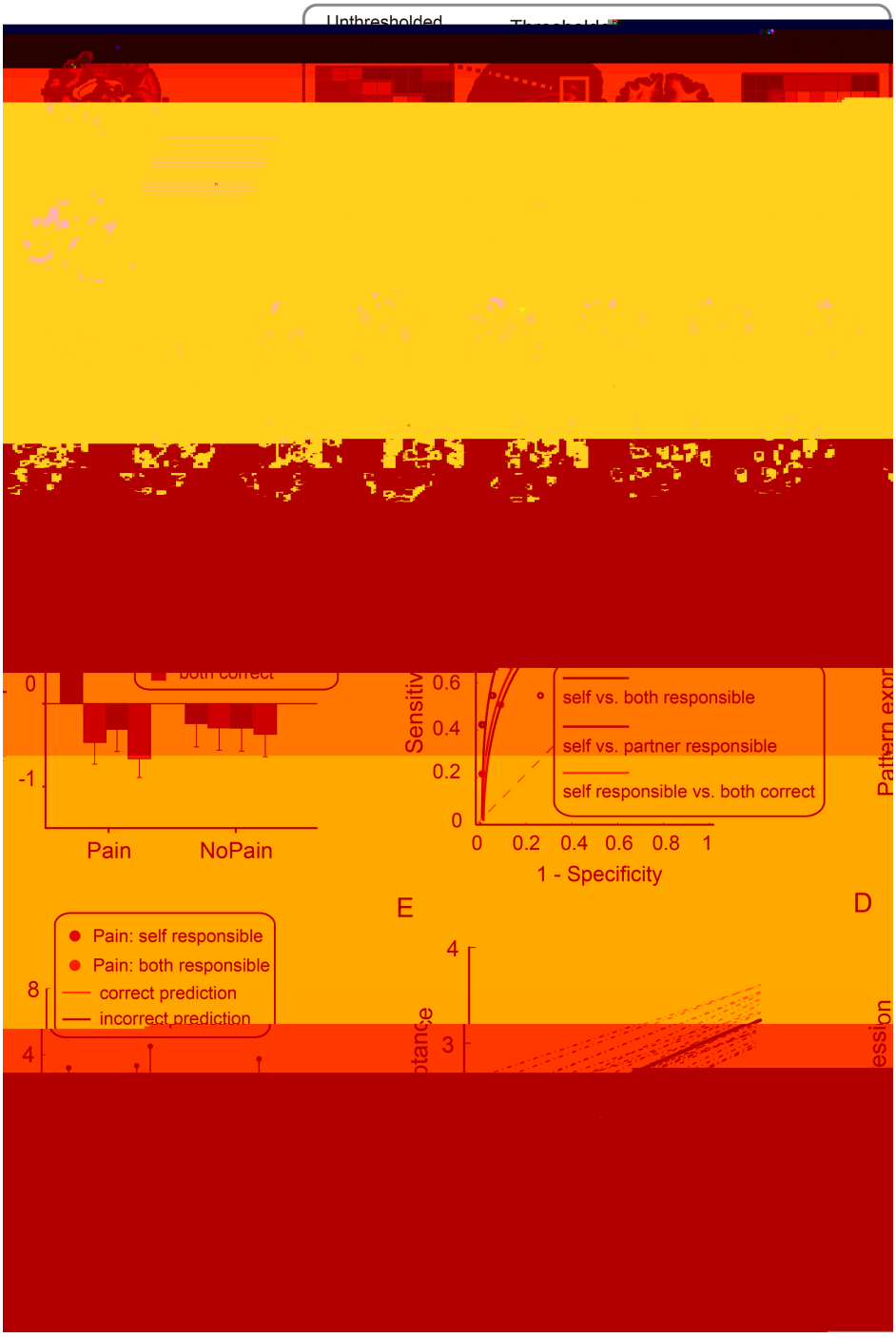
ot Cust rss o n r ontan or t an o ss n ant at P< un orr t

p r or an. orr t s n orr t uss F ur A s o s t unt r s o G B t ap t n t E ot on ta ana t. ap As an, s n t a CC orso a pr ronta ort, at ra nsu a an t, ran n.u n t p r aqu u ta ra AG, t post pr t ts or t tn a ut stat a, For ustrat on purpos s o a t r s o t ap o, ta n ro a, ootstrap pro. ur t rat ons z> F A ns t It s ou, not t att t ap s a str, ut patt rn n . a t o s n t E ot on as ontr, ut to t .ass at on E a p so unt r s o patt rns t na CC an r t AI ar pr s nt n t ns ts att rn pr ss on a us r t t stan., t n a na t at on ap an t .ass r r pr s nt, a pr pan n t atur spa. oo, ta n s n patt rn pr ss on a us or a. on t on an a. part.pant o put t ot pro u t o t ross a at t ap o t ut patt rn an t n ua ontrast a s s patt rn pr ss on a us r t n t st or r n.s, t n p r nta on tons F B o put t or. .o. .ass at on a ura. or o t t o on tons n qu st ons r orr t .ass, as on t r patt rn pr ss on a us . rop rat n .ara t r st. C ur as r at, as on t p r or an. o t .ass at on att rn pr ss on o G B or t t on tons n tu s o a s n ant B o. an s o a n, ut o spons, Bot spons, artn r spons, an Bot Corr t nt ra t on F P< ann o par sons s o t att patt rn pr ss on or t an spons, as s n ant r t an a t ot r tr on tons n t an, o. Ps< F C t patt rn pr ss on o t ot r t r an on tons not r s n ant, t n on anot r As s o n, t C ur s n F ur C t G B s r nat an spons, rsus an Bot spons, t ± a ura. P< an spons, rsus an artn r spons, t ± a ura. P an an spons, rsus an Bot Corr t t ± a ura. P For t o an, o. t on s n ant r n. nt par s o par son as, t n o an spons, an o an Bot Corr t P

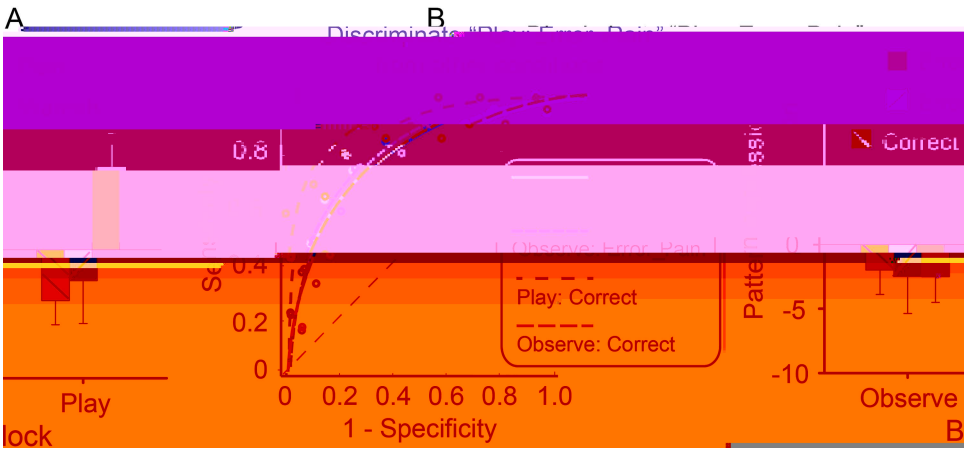
a or t o t part.pants out o , t ar r patt rn pr ss on or t spons, t an or t Bot spons, on tons an, o. F D or o r r ss on ana s s s o t att patt rn pr ss on a us n t an, o. as pr t o pan s ar n .o. r parat on $b_{patt\ rn}$ ± t P su st n t att G B ontan s n or at on or aton nt n u t stat s F E

t n t st t rt pr t po ro t G B an, n ra to tu anot r I atas tus n as ar nt rp rsona trans r ss on para o, an ta o t s n o put patt rn pr ss ons o t u t patt rn app to a. on t on o tu att rn pr ss on o t G B or t s on tons s o as n ant F, a., A n. nt ra t on F P F A ar s o par sons s o t att patt rn pr ss on or t a Error an as s n ant r t an t a Corr t P t, s r Error an P an ar na s n ant r t an t a Error ar t on t on P att rn pr ss on o t, s r on tons not rs n ant, t non anot r F A t nt st t .ass at on a ura., as on t s patt rn pr ss on a us As s o n n F ur B t G B s r nat a Error an rsus, s r Error an t ± a u ra. P a Error an rsus a Error ar t t ± a ura. P a Error an rsus a Corr t t ± a ura. P an a Error an rsus, s r Corr t t ± a ura. P In su t s r su ts s o t att pr t po r o G B n ra s to a no an o p t n p n nt atas to nt rp rsona u t

In tu an tu an pu at t o r t a ant . nts o u t nt rp rsona ar an on s o n r spons, t n aus n t at ar o, an ta Yu ta u ts natur t r or s ou aptur t r sup r a t nt ra t on p r or an. o our u ts natur t t s r tr on t not s r nat s o r spons, t n aus n non ar u ons qu n.s tu o an spons, s o an Bot spons, on tons a ura. ± P nor t s r nat ar u ro non ar u ons qu n.s or . t part.pants r not r spons, tu , s r Error an s , s r Error ar t a ura. ± P , s r Error an s , s r Corr t a ura. ± P Ho r t r spon as s o a, o n part.pants r r spons, an aus n ar



F ur G B an ts s nst t A B t n part .pant t ap or u t stat s unt r s o Bootstrap t r s o aps nt ra t ons z > s s o n n t ns t E a p s o unt r s o patt rns t n r t nsu a rAI an ant r or a CC ar a so pr s nt n t ns t s a o or squar s n at o ts , a . squar s n at s pt o s o at outs o t G B patt rn an r out n squar s n at s n an . at P < un orr t s a so a , B Cross a at patt rn pr ss on o put as t ot pro u t o t G B t t a t at on ontrast aps or a . part .pant C C ur s or t to . o . or . a t rnat a ura . s or t tra n n atas t tu urp an spons , rsus an Bot spons , an spons , rsus an artn r spons , Go an spons , rsus Bot Corr t D In ua part .pants patt rn pr ss on a u s or t an spons , an an Bot spons , on t ons Gr n n n at s orr t .ass at on r n n at s n orr t .ass at on E patt rn pr ss on a u s n t r rrorous on t ons n t an , o . spons , Bot spons , an artn r spons , r pr t o part .pants o p nsat on pa n s ar n



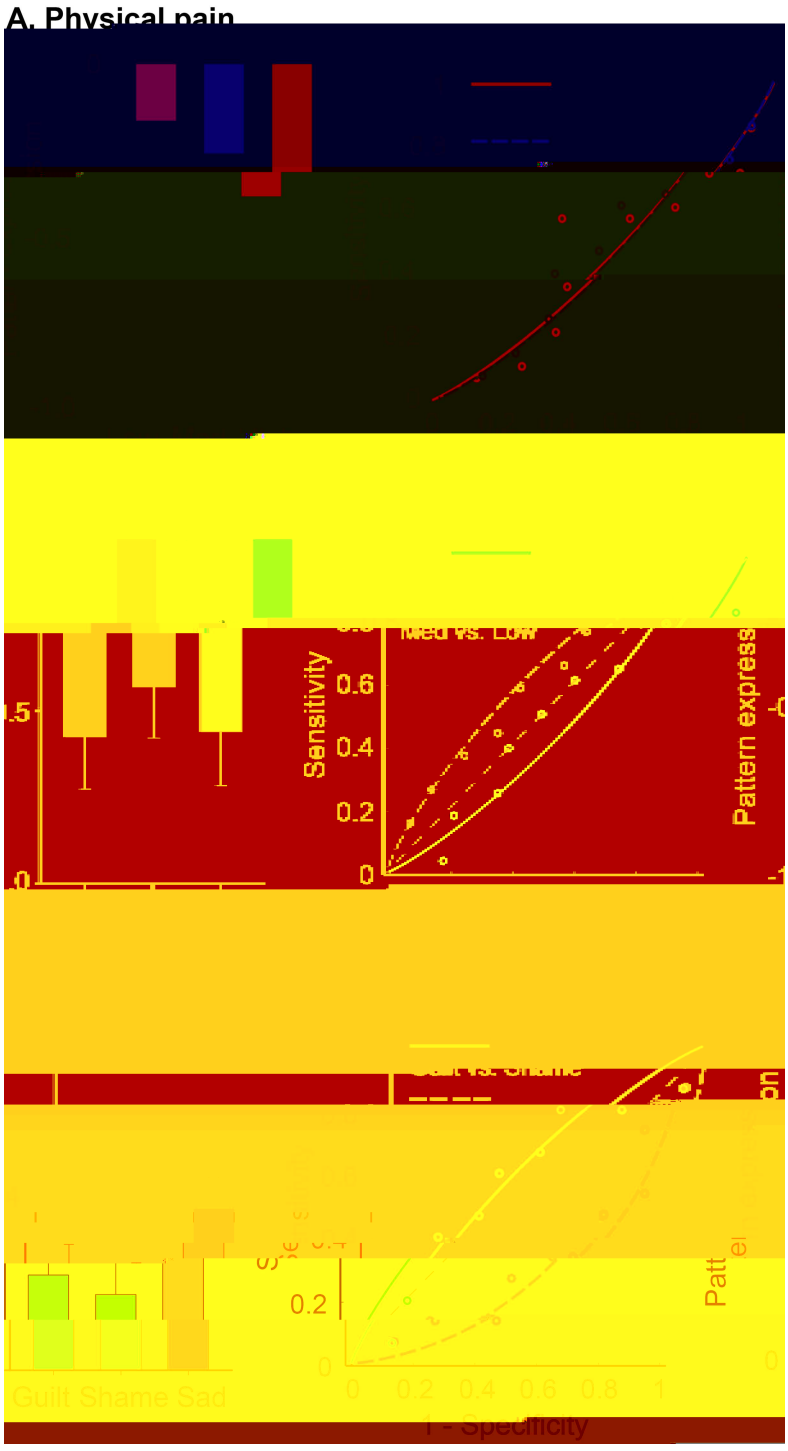
F ur G n ra a, t o t G B A Int tu atas t t a Error an on t on t on asso at t st u t s o st st patt rn pr sson In t s on t on t part .pants a t on aus pa n t o t pr son outs t s ann r partn r In ar t on t ons t part .pants a t on a aus ar , ut not pa n u t r a st u at on t o t partn r In , s r on t ons t part .pant o s r t a an t pa n st u at on as not ont n nt on t ra t ons Error , ars n at E B C ur s ort t o .o . or . at rnat pr or an . ort a at on atas t tu Bu a Error an rsus a Error ar t urp a Error an rsus , s r Error an a Error an rsus a Corr t Go a Error an rsus , s r Corr t

Testing the Specificity of the GRBS

o ass ss t sp . .t o t .ass r a n ts pr t po r n t o ot r n p n nt ata s ts on us n t r a at pa n an o , s r ar ous pa n r s nan t a t ot r us n r a tas to .t , as .an so .a ot ons a n r t a n ar at ana s s r port n t s pr ous stu s a p t t , ran r ons s on st pr t ts n t G B a CC rAI n t pro .ss n o p s a an ar ous pa n an n t pro .ss n o r a u t p so s Ho r t s an op n qu st on t r t s , ran stat s ar st n us a , to G B u t ar at approa . a o s us to t st t r s ar un ar at a t at ons r t o on n ura r pr s ntat ons oo t a As an , s n ro F ur s a so upp ntar a , G B pr or at . an . n s r nat n r n t nt nst o t r a pa n st u at on H s u a ura . ± P u s o a ura . ± P an r n t r o ar ous pa n H s u a ura . ± P > u s o a ura . ± P .ass r not s n ant r nt at r a u t ro t r r a sa or s a ura . ± P or r a s a or s a ura . ± P s n n s su st t at G B s , tt rat t t n trans r sson n r a t n t r p rsona ont ts t an ot r unp asant p r n . s n . u n u t r at or s at s t o s not app ar to , s t a t at ur n r tr a o u t r at or s , ut t o s r spon s t to , a . n at n t at on as aus ar to a partn r an pr tsa on nt , a or F na n st at t r at ons p o t G B to ot r pot nt a s ar , ran s natur s o so a a t pro .ss s pat a s art ar son orr at on o . nts a ross a o s , t n t G B an t ot r , ran s natur s r at to so a a t pro .ss s ar s o n n upp ntar a , an F ur ost patt rns s o aroun ro orr at on r s , t n – an t t .pt on o t I E op to tra . n at a t asso .at t unp asant a s C an t a . s o a a post orr at on r t G B t us su st n so s ar ar an . , t n t os t o , ran patt rns o a n t s s art or .os qua tat a n t r t t , r n , s ar post or n at ts n ACC or nsu a or ot r ar as o t n a t at , ot ona nts su . as t a a a Is n , as on anato a a , s an t F .at as rs on , a an t a F ur A s o st ont str , ut on o nor a z s or o ts o I E on t x a s an G B on t y a s . o , an t a D r nt o or o tants n at o s o s ar post or s ar n at tants an r sp t s t post ts or G B tant an or I E tant s t n at ts or G B tant an or I E tant an o s r t o ts o t to s natur s nt n oppos t r t ons tants an F B ra orr at ons , t n t t o patt rns n t ot on as F A an n t t r Is F C–E r r at a A ross t o ot on as stron r ts su o squar stan . s to t or n D r a tua o , s r n t nons ar o tants Furt r t t r Iss o st n t patt rns o o ar at on , t n t t o patt rns an o s n t , at ra a a a s o post ts or I E , ut not or G B as r t , t D n tant F C s s n n t t on sta , s ro o t a a a n ot ona att nt on s u u r or a r an n ass nn a t sa n . to s nsor st u Dou B at ra nsu a s o stron st ts n t tants an n at n an post ts or u t sp . a tant as ass ar post ts a ross t t os natur s tant , ut a so so an o s t n at ts n t I E tants F D F na t ACC s o a ost .us post ts or G B . r ost n ar ro or n n at or I E tants an F E us t nsu a t n .u so s ar post ts t o ra r su ts su st st n t a t at on patt rns or u tan p tur n u . n at a t n ot on r at , ran ar as

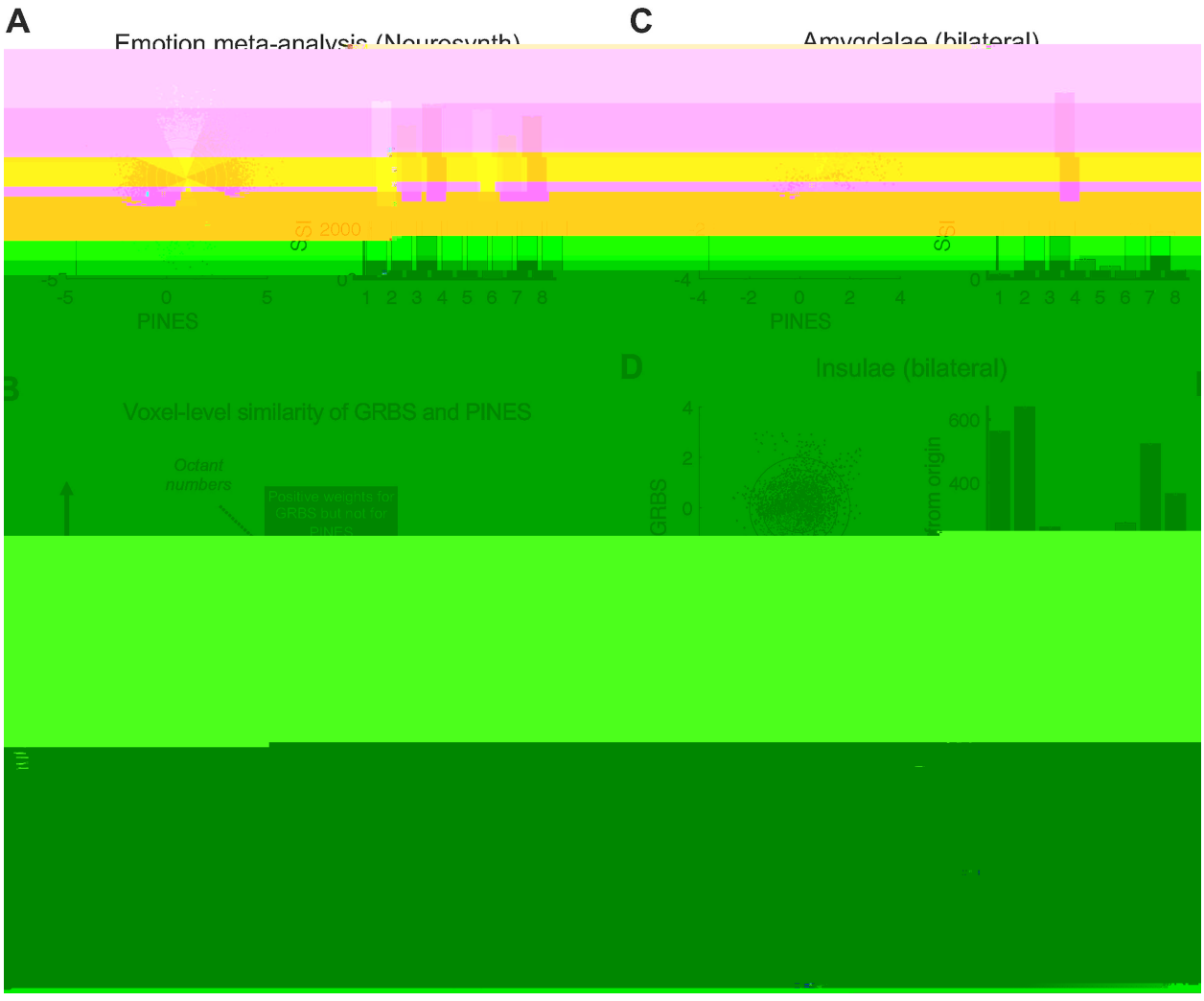
D s on

C ara tr n o sp . . ot ons ar n rat an r pr s nt n t , ran s a . ntra qu st on n a t n uros . n . an portant or un rstan n ot ons an



F ur p . t o t G B A C att rn pr ss on an C ur s ort pr ton pr or an . o G B nat r a pa n atas t A a arous pa n atas t B an an oton r a atas t C G B annot sso at rnt so p s a pa n arous pa n or rnt t p so otona or s n u n u t r at or s su st n t att pr t po ro G B ass sp . to t t n on s r spons t n aus n un s ra nt rp rsona ons qu n s ar nt at so a nt ra t on ont t s a so upp ntar a Error ars n at E

t r r u at on n a t an . n a n ua s Ha ann st n t ra n orr at s o rnt ot ons as pro n to B st r os . t a Ho r n t su stant a a r . a n n oa . a r qu r u t ar at o rap t n ra n orr at s o rnt ps . o o a approa . st at o on ontr ut ons o s n ra n r ons pro . ss s n u n pos t an n at ot ons o r t a oo t a ra an aBar rr an a n qu st an Barr tt a r t a nt n a r t a pr s nt r su ts ontr ut to t s



F ur o spata s art , t nG B an p tur nu . n at otons natur I E A attr pots spa snor a o t nt E oton as , ta ts orG B y a s an I E x a s Bars ont r tr prs ntt su o squar stan .s ro t or n or a . ortant s a unt rat st nu , ro o s an t r o , n ts n a . ortant o put B D rnt o or ortants n at o s o s ar post or s ar n at tants an r sp t s t post ts orG B tant an or I E tant s t n at ts orG B tant an or I E tant an o s r t o ts o t t os natur s nt n oppost r tons tants an C o spata s art n , atra a a a s o s post ts or I E , ut not orG B as r t , t D n tant D o spata s art n , atra nsua s o s stron st ts nt tants an n at n an post ts or ut sp . a tant as ass ar post ts a ross t o s natur s tant , uta so so an o s t n at ts nt I E tants E o spata s art n ACC s o s a ost . us post ts orG B . r ost n ar ro or n n at or I E tants an

un rta n , pro n rst n . t at n o p so . a or ora ot ons su . as u t an , a urat nt , as on a str , ut u t ar at , ran pattrn t G B D op n a u t ar at pattrn or t t n t prs n . o u t r at ps . o o a stat s ps us to un rstan t n ura . an s un r n u tan aton nt an s r s as a too or utur stu s t at a at an pu at n an or asur n u t n r nt n ron nts an popu at ons a r ta C an ta rs nan ta

Int rp rsona u t r tst a , t to t t an r spon to a s tuat on r so on s s ar an n . on s s t sour . o t at ar Boon n s t p o u t s t ou t to , r t a or anta n n so . a nor s an nt rp rsona r at ons ps Bau str t a nt trans r ssors s a urat t t n su . a s tuat on an r at n appropr at a o s t to r stor t r putat on an so . a r at ons p t t t a r t r . pro . t Yu t a an ot rr ant n ua s nt so . a n t or a n r t r . pro . t an so . a a t arns an arrott or o r t trans r ssors pr ss on o u tan on . ator stur s r a r t a , n po ro t o at so . a nor s an o p nsat t oss o t t B . r ara n an approa . us or ot r so . a a t pro . ss s oo ta rs nan ta us on I ata to . ass t pr s n . rsus a , s n . o t or appra sa o u t na on s r spons , t n aus n ar to anot r G B a oo ross a at pr t a ura . an s n ant pr t o p nsat on , a or t us n n o n t , ran pro . ss s to r ant , a ora out o s Furt r t G B s o a ura . on

a o p t n p n nt t st s t ro a r nt a orator an ur onstrat n ts ro ustn ss to ar at ons n p r nta s tt n s an ura ont t s s natur n a str ut patt rn a ross t nt r E ot on n t or Yar on ta ts ts st pr t t nt a CC an r t AI F A At ou t s p a o s para t pr ous un ar at ana s s o an ta Four ta Yu ta Cu ta t n rt ss ontr ut n p n nt to t un rstan n o t n uro o nt . ans o t t n on s trans r ss on an ra t n a or n ut ar at ana ss r s a t ap t at ptur s t or pro. ss s un r n nt rp rsona trans r ss on an u t s a, strat t ap an t n, app to n o, s r at ons ro t sa or r nt atas ts to ass ss ts s ns t t sp . t an n ra at on a r ta p . a n t o s to t a CC an AI t ns r s a . n. u n t os o our o n as onstrat t a . o un t ona sp . t n t s ar as us n n uro a n ta ana s s an ut ar at patt rn ana s s n qu st ta a r ta Yar on ta a as oar u an pro n. t at ut ar at patt rn r at a t n su . ar as o rs r at r un t ona sp . t t ans p nt rpr t n o r app n a t at on ra t a For a p n ra ta oun t att a CC ontains a popu at on ut ar at r pr s ntat on patt rn r at to pa n t at n ra s a ross t p s o so at .pa n t st a ross stu s, ut s not s ar , n s o n at ot on tas s or n s o o nt ontro tas s ar u t at ut ar at patt rn ana s s or s , aus t p . s up to so r on r nt a patt rns o a t at on a ross n ura popu at ons an ro as u atur t at ar un n str ut a ross o s or r an s uss on s ra ta

upport n t not on o st n t ut ar at patt rns or r nt a t pro. ss s oun on a orr at ons , t nt G B an ot r pa n an ot on r at , ran patt rns su . as t I E Furt r n o a patt rns n ot on r at ar as n . u n t ACC an nsu a s o on t s ar ar an . , t nt G B an t I E Int r st n t patt rns o s ar rsus un qu ts or t t o s natur s r st n t a ross t t r r ons o nt r st nsu a s o so n . o o on post ts or, ot G B an I E . s n n t part a s ar pro. ss s In ontrast a a a an ACC o s t post ts or on s natur r o t n n ar ro or a n n at ts n t ot r s natur su st n r st n t o a ontr ut ons to t o ra patt rns

or o r n t urr nt stu t s natur as r ro a sa p o C n s part .pants East As an u tur an t pr t po r o t s patt rn an , part a n ra to a sa p o Cau as an part .pants st rn u tur su st n t att or un r n n uro o nt pro. ss s a , s ar n a ross r nt u tur s an p r nta s tup G B as a so s ns t to t s o u t as an pu at ar spons , t or anot r s pa n t nt ra . t a t on on tor n tas Y t t s natur not s r nat so t rp s a pa n r . n pa ust u a ton r s nan ta or ar ous pa n o, s r n ot rs r . n pa ust u at on r s nan ta F A C . ar , ot arous n a rs sa nt p r n . s Int r st n t s natur not s r nat u t r at or s ro ot r t p o n at ot ona or t r F D F or so u t p so s a n o r on t on o on s aus t n ot rs su r n , ut o not n o t pro. ss s o t t n an r spon n to su . o pon nts n t r an no so a ont t a an . , a . a n to t r our n n s su st t at n an nt rp rsona trans r ss on ont t t trans r ssors, ra n o s not on ptur t str ss u ons qu n . o ot rs *per se* as n t as o p r n . n ar ous pa n, ut a so a t s st attr ut on o t ar an n on s o n r spons, t s on r . s o to r spon at on nt apo o s n n to t r t t pr t po r o t GB n tra . n r para t on, a or o p nsat on su sts t at, ra n a t at on patt rns nt r a pr ar p at t pa t o u t r at appra sa on su, s qu nt , a ora r spons s n n t t not on t at ot ons s r to u a apt , a ors an n rat orr spon n a t ont n n . s s ts a , a, s nt n r a u t t us pr . u n a su . ss u o n o GB nt s on t on Furt r not t at n ua r n . s n G B r spons s r not pr t o u t rat n s n t r atas t n p anat on s t att rat n s o su, t n s o u t r o o t at r t tas nt s an ran t us r s p r a n natur r ast G B as our r suts s o s sp . t o t t n an r spon n to at trans r s s on A t rnat t n ua r n . s n G B r spons a , n un . , ot r a tors su . as o ra s na an our sa p a , un rpo r to t t s a , t n p rson orr at ons Futur stu s t at s u tan ous r or Ian or s nst on n asur so ot ona n o u t a patt rn s n on ut an . s Yu ta a , a, to p or G B s ro s n t t por a un o n o u t pr n . na t t n t pr s n . o on t ant . nts o u t n o n u t n s as p r n . at n nt rp rsona trans r ss on an pr t n aton nt o o n u t A o o t a or , roa t u t ar at approa . an n or our un rstan n o t n ura , ass o so a o n t on , op n , ra n s natur s t at ptur sp . a n on t pro. ss s an t st n t r n ra a, t to ot r so a on t un t ons s a ou , a, tor str ut ur our un rstan n o so a on t on ont , ass o un r n , ra n r pr s ntat ons A on . ptua a. ar at on a, out u t an r spons, t s ort not n In t s pap r u t r rs to a onst at on o on t a t pro. ss s nr spons to nt rp rsona trans r ss on an ar t t n ar an ass n n r spon s, t rat rt ans p t n p r nt a o pon nt o t s onst at on o pro. ss s n t s on . ptua at on o u t r o n n on s aus r spons, t s an nt ra part o u t E s ort an t ra . an o ns rat r t an an n p n nt pro. ss s t at s para to u t at ast n ost s tuat ons rt ss a . no t at t s an nt r st n an portant pr a qu st on as to t r u t n s anars n . rta n popu at ons or . u stan . s t out o, t aus r spons, t n nt rp rsona ar For a p sur ors o sast rs or atro . t sso t r port t att p r n . u t n s to ar ot r t s o su ru . or tant o sp t t a t att ar not aus r spons, or ot r t s su r n n poss, ps . o o a . ans un r n su . sur or u t s t atsur ors as attr ut r spons, t o ot rs su r n to t s s Connor ta ar st nt a u t n at n s to ar on s as a purpos ss or un ort , n pr n . , p op t . rtan t p o pr ss on

s s to , ar su t o usor p r pt ons o r spons , t at . Con rs so n ua s t os n ps opat C a t a a a t attr , ut on o r spons , t or ar t out n u t u t s na tur ou , us as a too to pr a t st t s pot s s n ortunat r t sts o t s nt r st n poss , t s ar , on t s op o t s pap r an a a t urt r stu s s n or t s purpos

It a , ar u t att t r u t s notus qu a nt across C n s an ss u tur s an an ua s s s r at to a or pro oun ssu as to o ou no t r or not p op n n r nt u tur s an sp a n r nt an ua s ar p r n . n t sa n o ot on n t a t att ar n u t En s or s . u G r an or oupa , Fr n . orn u C n s Int s stu a opt t assu pt on t at u t r rs to a at or o ot ona stat s un r . r nt ar ants o u t ar sp . s t ar ant sp . . n n atur s or r nt a sp . . t p o u t t at n st at n t s stu as a ar u s n , t o rt a atur s Bau str t a ra . an o ns r o n n a , ra . o ora nor s t p a n o n ar to anot r an attr , ut n ausa r spons , t n su . o at on to on s s t o atur s a , n onstrat to , r a , o n t ant . nts o u t n , ot str n an East As an u tur s B n t rs an n r B or an H an on an sa an a , n an pu at to n u . u t n , ot str n Bast n t a Cra o t a o , an t a ara Car oso t a an East As an part . pants n t a Furu a a t a Yu t a Z u t a In t t s t or t a an pr a or s ut t s t o n n atur so u t n t tas s o our tra n an t st atas ts I portant t s not r qu r t at part . pants ro a u tur s p r n . t s t p o u t to t sa r n r spons to t sa stuat ons ur ana s s r qur on t at t s p r n . to so r , part . pants across u tur s s o t at t u t r at patt rn nt as n pr s r across u tura at ast nt ont to our stu t r , pro n pr a support or o on across u tura , ra n pro . ss s s n n t n st o ona t nt ont a t pro . ss s un r n u t to t o part a s ar o n t a t pro . ss s un r n u t an ts , ra n orr at s across u tur s an ont t It s an nt r st n an portant pr a qu st on or utur r s an . as to at t ntt ss natur ou s r nat r nt ar ants o u t , ot t n an across u tur s aus n p s a ar rsus so . ar aus n ar to a r n rsus a stran r

o , sur ar not t rst to p or o ot ons ar s , r at n appra sa t or t patt rn r o n t on ana s so u ann uro a n ata or ar s A ops For a p rr an a s o t at s r t ot on at or st atp op ass nt o a n ot on . t n nt an , a urat pr t , as to a , stra t atur so t nts t rt prota on st s r spons , or t out o n t nt sa , stra t atur , as o outp r or an . s t pr t ons , as on t o ot r n unt a o s o ot on t , as . ot on t or an t arousa a n . t or A opt n a s ar t or t a ra or t appra sa t or o ot on our stu an , s n as a as stu o us n on nt rp rsona u t t r spons , t or ar to anot r as ts or appra sa In a t n rr an a s n ran atur spa . o r n a ran o appra sa ns ons t atur aus , s s ost ons st nt t to , r ant to u t Futur r s ar . ou ra t s atur spa . approa . to or a t st ps . o o a ann u pot s s on . rn n t st n t on or t a . t r o , t n u t an ot r r at so . a an nonso . a ot ons su . ass a , arrass nt an nonso . a r r t sapproa . a so pro s an nt r st n , ra n , as a to o par ot ons a ross u tur s A t ou a on to on app n o ot on t r s a ross an ua s a , pro , at . a , stra t nt atur s ar ss to , ost n trans at on an s ar ross u tura Hurta o n o a ta F s

n ra a , t o t G B to tu s s t In part u ar t r n . , t nt patt rn pr ss on o t a Error a n on t on an t ato t a Error ar t on t on as at tr n s t , n part u to t s a sa p s o tu Anot r on tur s t at nt att . ass r as tra n to s r nat on s ausa r spons , t n nt rp rsona ar t t , or s ns t n t t n r n . s n r spons , t t an n t t n r n . s n t s r t o ar s s support , t a t t att s natur r spon or st nt to a Error a n rsus , s r Error a n t o on t ons t at r on n appra sa s o r spons , t , ut not n s r t o ar r or a . no t at our oa o op n a s ns t sp . . an n ra a , , ra ns natur o u t as t to , u a . , ut , t pr s nt u t ar at patt rn s , ot us u an a r t a ot at n st pp n ston to ar s a stu s t at ou , r qur to pr ror a or n t nt at on o ross u tura n ura r pr s ntat ons o u t Futur stu s ar n to a . t s oa n ar r sa p s an to n orporat or n ra n an pu at on o u t r spons , t s r t o ar r at ons p , t n trans r ssors t s t . rt ss t ut t o a pro s ona o su . as ours t , o . ar r n o par t asur s n ot r o ans t at a , n on part a a at an or a t sp . . t For a p a . r at a t s rout n nt n I n n ua s an n spt o tt to no a at on o ts sp . . t to a . s n t at n ua an , ata , sp . . t o t n ra ar a o t us or a . ar a t s rout n us to n r t pr s st n . o a . r at r pr s ntat ons n or n or Dru a an D Espos to s a o . an ost on t r or o n t a att nt on Yun t a an ot rs E n r at or t sp . . t s r ason a , or us o an I patt rn or urt r t st n at ou t s o o o on so ust , a uat on a as , as , ass In a s ar n t r ar r , o ar rs n . n t at ar s ns t an sp . . , ut n o rat a nost . a u on rs n or at on In t sa spr t our u t r at patt rn on rs n or at on a u as as a n , ra n asur or pro s ona n r n . , ra n o par sons an urt r t st n an a at on on t , ra n , as s o so . a ot ons

o on . u op a n ura s natur t G B t at s s ns t an sp . . to t r t a appra sa s un r n t pr n . o u t n so . a nt ra t ons na r o n n on s r spons , t n aus n ot rs su rn Fr a Bau str t a o n ts pr t a t or , a ora out o s t r spons o t ss natur pr t sta on nt . s ons o o n trans r ss on n a t r stat st a ontro n or p r nta an pu at r

o r spons , t upport n ts s r nat a t t G B notr spon to u t or s or or so ot r n at ot ons n t r G B r spon r nt to n r as n s o ar ous pa n or n r as n s o a n . n non ar u out o s It as a so not stron orr at t an ot r pr ous op a t or pa n r at s natur ru n out t poss , t t at t r ts n ra n at a t or ot r r at at or s o so .a ot ons pat or pa n an p r .pt on o s a n . s s natur an , us n utur stu s or t t n u t an trans r ss on r at n ura pro .ss s or a p , an pu at n ot r portant so .a a tors su . as nt nt ons o trans r ss on an nt rp rsona r at ons p , t n trans r ssors an t s , app n t to ar , as ora .s on a n ont t Yu Cro . tt or , t st n ts r spons n r nt . n a popu at ons su . as t os . ara t r , . ss or r u . p r n . o u t nt rna n sor rs rsus ps . opat

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