

;QOLKE CS6BCKAC DLO CUMCAQ?QGLK ?B?MQ?QGLK BR0GKE I?KER?EC RKBCOPQ?KB6KE# KLQ ?

OCMIGA?QGLK D?GIROC% - OCMIV QL 3 ?006KEQLK ;Q?AH# 4? J CP# ?KB > ?QPLK !(&'*"

G[_a_l) Q+ Cfilc[h.)/08 ?ol]bcff) W[]b[ls.)/8 ?ombiha) T_^h_m^[s.)/

·A_j[ln g_hn i` ?l[ch [h^ @iahcncp_P]c_h]_m) Rhcp_lmcns i` Oi]b_mn_l) KV .13/4) RP>

/@_hn_l`il I[hao[a_P]c_h]_m) Rhcp_lmcns i` Oi]b_mn_l) KV .13/4) RP>

⁰A_j[ln g_hn i` @i g jon_l P]c_h]_) Rhcp_lmcns i` Oi]b_mn_l) KV .13/4) RP>

T il^]iohn g [ch n_rn7 v 6)2--

Fh]fo^cha mojjf_g_hn[ls g [n_lc[fm7 .3205

HaNYU``QP `[BQY[^e " 9[SZU`V[Z M_ M ^Q\Xe `[>M^VZS`[Z H`MOW% @MYQ_% MZP LM_[Z #*()O\$

@ill_mj ih^cha [onbi17

Q+ Cfilc[h G[_a_l
[`d\[_a_l=ol+li\]b_mn_l+ ^o](#)
J_fcil[E[ff)
Rhcp_lmcns i` Oi]b_mn_l)
KV .13/34*- /35
RP>

- @PQ0?Aq

O_]_hn chjon [``_]nm mo\m_ko_hn f[hao[a_ jli]_mmcha+ Lh_ _rjf[h[ncih`il nbcm
bif^m nb[n] i g j l_b_h^_lm [^[j n nb_cl c g j f c] c n fchaoemnc] _rj_]n[ncihm \[m^ ih nb_
chjon) mi [m ni `[] c f c n [n_ _`c] c_hn jli]_mmcha+ > hog _l i` mmo^c_m b[p_c^_hnc`c^
mojjiln`il nbcm bsjinb_mcm+ E[lhchanih Pn[e) G[g_m) [h^ T[nmih %/- .5& l_jiln [
`[cfol_ni l_jfc][n_ ih_ i` nb_m_ mmo^c_m %Cch_) G[_a_l) C[l g_l) [h^ Nc[h) /- .0&+ T_
mbiq nb[n] ni nb_]ihnl[ls) nb_^ [n[`li g E[lhchanih Pn[e] [h^] iff_[ao_m] ihmnenon_
mnlaha mojjiln`il nb_ bsjinb_mcm i` _rj_]n[ncih [^[j n[ncih+ P_p_l[f `[] nilm
]ihnlc\on_ni nb_ ^c``_l_h]_ ch]ih]fomeihm+ Cil_r[g j f_) E[lhchanih Pn[e] [h^
] iff_[ao_m] [lao_ \[m^ ih ^c``_l_h]_m ch *p[fo_m) qbc]b cm ehqh ni _
jli\ f_g [nc]+ T_ chmn_[^ _g j f i s q f f * i l g ^ ? [s_mc[h g_[mol_m i` _pc^_hnc[ls
mojjiln ni [mm_mm l_jfc][ncih mo]]_mm+ J i m n] l c n c] [f f s n b i o a b) n b _ h _ q _ r j _ l c g _ h n m
\s E[lhchanih Pn[e] [h^] iff_[ao_m ^c``_l ch ^_mcah`li g nb_ _rj_lcg_hnm nb_s [c g
ni l_jfc][n_+ T_] ill_]n`il nb_m_ ^c``_l_h]_m \s g_[hm i` nb_ m[g_ mchaf_*
j[l[g_n_l _fc`*oj^[ncha g i^_f j l_p c i o m f s _g j f i s _ ^ \ s Cch_ [h^] iff_[ao_m+ Qb_
g i^_f j l i p c ^ _ m n l c [f * f _ p _ f j l ^ c] n e i h m ` i l n b _ m o l j l c m [f n b [n] i g j l _ b _ h ^ _ l m
_rj_lcg_h_) \[m^ ih j l_p c i o m c h j o n q c n b c h [h^ i o n m c ^ _ i` nb_ _rj_lcg_hn+ Qlc[f*
f_p_f [h[fsm_m`ch^ nb[n moljlc m[f \[m^ ih [^[j n^ _rj_]n[ncihm mnliahfs j l ^ c] n m
l_[^cha nc g_m ch \inb nb_ ilcach[f [h^ nb_ l_jfc][ncih ^[n[+ Fh `[]n) ih]_ nb_
^c``_l_h]_m ch ^_mcah [l_] ill_]n_ ^`il) nb_ n q i ^ [n[[l_ T U S T X e m c g c f [l8 l_jfc][ncih
n_mmm _mnc g [n_ nb_ j i m n _ l c i l j l i \ [\ c f e n s i ` [l _ j f c] [n e i h _ a 0 0 0 _ n i \ _ O + 6 6 6 6 + T _
mbiq biq nb_ m[g_ _fc`*oj^[ncha g i^_f [fmi j l ^ c] n m n l c [f * n i * n l c [f j l c g c h a)
] o g o f [n e p _ j l c g c h a) [h ^ n b _ c h p _ l m _ j l _ _ l _ h] _ _ ` _] n c h j l c g c h a +

5CVTL0BP+_rj_]n[ncih [^[j n[ncih8 m_hn_h]_ jli]_mmcha8 ? [s_mc[h8 _fc`*
oj^[ncha8 l_jfc][ncih n_mn8 l_[^cha nc g_m

T_l_jfs ni [l_jiln_ ^` [cfol_ %E[llchanih Pn[e] G[g_m) \$ T[nmih) /-.5) b_h]_`ilnb EP.5& ni l_jfc][n_ [mno^s ion i` iol f[\ %Cch_) G[a_l) C[lg_l) \$ Nc[h) /-.0) b_h]_`ilnb C.0&+ ? inb mno^c_m n_mn [bsjinb_mcm [\ion nb_ [^ [jncpens i` cgjfc]cn _rj_]n[nceihm ^olcha ch]l_g_hn[f m_hn_h]_ oh^_lmm[h^cha { biq] igjl_b_h^_lm l_]n ni]b[ha_m ch nb_mn[nemnc]m i` nb_chjon qb_h nb_s_hn_l [h_q fchaoemnc] _hpelihg_hn %mo]b [m [h_rj_lc g_hn il [h_h]iohn_l qcnb [h oh` [gfc[l nfe_l&+

Rmcha ?[s_mc[h l_jfc][nceih n_mnm) q_ mbiq nb[n nb_h_q mno^s cm ohfce_fs ni]ihmncnon_ [l_jfc][nceih` [cfol_+ O[nb_l) nb_ ^_mcah i` nb_h_q mno^s ^c``_lm`li g nb_ilcach[f mno^s ch q[sm nb[n [l_jl_ ^c]n_ ^` \s nb_n_mn_ ^ nb_ils ni f_ [^ ni ^c``_l_hn_ ``_]nm+ Lh]_ nb_m_ ^c``_l_h]_m [l_n[e_h chni []]iohn { \s g_[hm i` nb_m [g_ . *j[l[g_n_l] igjon[nceih[f gi^f nb[n ginep[n_ ^ nb_ilcach[f _rj_lc g_hnm %Cch_) Nc[h) G[a_l) \$ G[i]i\m) /-.& { l_jfc][nceih n_mnm mbiq nb[n nb_h_q mno^s \s E[llchanih Pn[e] [h^] iff_[ao_m cm Qd^QYQ% fce_fs ni]ihmncnon_ []fim_l_jfc][nceih i` nb_ilcach[f mno^s \s Cch_ [h^] iff_[ao_m %nb_jimm_kcil jli\ [cfens i` l_jfc][nceih)] igj[l_ ^ ni [hoff_ ``_]n) cm _mnc g [n_ ^ ni _ O +6666&+ Lol [h[fsm_m mbiq nb[n \inb nb_C.0 [h^ EP.5 ^[n[jlipc^_]f_l [h^ mcahc^c] [hn mojjiln nb_bsjinb_mcm i` _rj_]n[nceih [^ [jn[nceih+ Fh^ _ ^) nb_h_q _rj_lc g_hnm \s EP.5 mb_ ^` _olnb_l fcabn ih nb_mj_ ^ i` _rj_]n[nceih [^ [jn[nceih) [h^ nbom nb_ ^_al_ ni qbc]b cgjfc]cn _rj_]n[nceihm ^olcha m_hn_h]_ oh^_lmm[h^cha [l_]ihchoiomfs [^domn_ ^ ni ` [cfen[n_ ``^c]c_hn f[hao[a_oh^_lmm[h^cha+ T_ `ch^ nb[n nb_ ``_]nm i` _rj_]n[nceih [^ [jn[nceih [l_mo\mm[hnc(f) l_ ^o]cha j_l* qil^ l_ ^cha nc_g_m \s gil_nb[h 2- gm ip_l nb_]iolm_ i` nb_rj_lc g_hn { []b[ha_ i` ip_l 5- # ch nb_h_n_ ``_]n i` mshn[]nc] _rj_]n[nceihm ih l_ [^cha nc_g_m+

Bh]iol[achafs) nb_ gi^f [fmi \^QPUO`_ mg [ff_ ``_]n met_m jl_]cm_fs qb_l q_ i\m_lp_ nb_g _g_jlc] [ffs+ T_ ^cm]omm qb_h mg [ff_ ``_]n met_m [l_ni _ _rj_]n_ ^) [h^ qbs %il_l_ [mihm nb[n fche nb_jl_m_hn `ch^cham ni l_m_ [l]b ih _llil* [m_ ^ cgjfc]cn f_[lhcha []]iohnm i` mshn[]nc] jlcgcha+ Qbcm) q_ mbiq] b_fjm ni l_]ih]cf_ nb_]ih]fomeihm i` _l_ ^ \s E[llchanih Pn[e] [h^] iff_[ao_m qcnb nbim_ nb[n q_ l_] [b b_l_ { mj_]c^c] [ffs) q_ [al_ nb[n ih_ i` nb_ko[fc[nep_]ih]fomeihm g [^ _ \s Cch_ [h^] iff_[ao_m []no[ffs b[m chmo`^c]c_hn mojjiln ch \inb C.0 [h^ EP.5+ T_ nbom_h^ qcnb []ih]l_n_ ^_mcah jlijim[f`il`onol_ qile \ [m_ ^ ih iol gi^f_+ T_ _ach \s jlipc^cha nb_il_nc] [f]ihn_rn+

<FCLOCQGA?I @?AHEOLRKB+ 1UMCAQ?QGLKP ?KB CUMCAQ?QGLK ?B?MQ?QGLK

Lh_cgjiiln[hn mn_j ch nb_ ^_]i^cha i` g_[hcha`li g fchaoemnc] chjon cm j[lmcha { nb_ch`l_h]_ i` f[n_hn al[g g [nc] [f l_f[nceihm _nq_ h nb_ qil^m ch nb_chjon+ Qbcm cm [] igjon[nceih[ffs] igjfr jli\ f_g7 [fnbioab q_ nsjc] [ffs ^i hin _]ig_]ihm]ciomfs [q[l_ i` cn) nb_l_ [l_g[hs jimmc\ f_ q[sm ni] ig\ch_ [m_ko_h]_ i` qil^m chni [al[g g [nc] [f j [lm_+ @ igjl_b_h^_lm m_g ni ip_l] ig_ nbcm jli\ f_g [n f_[mn ch j [ln \s ^l[qcha ih cgjfc]cn al[^c_hn _rj_]n[nceihm \ [m_ ^ ih cgjfc]cn jli\ [\cfemnc] ehiqf_ ^a_ [\ion nb_l_f[nep_ %]i* & i]oll_h]_ mn[nemnc]m i` qil^m [h^ f[n_hn mshn[]nc] mnlo]nol_m+ Qbcm cm _pc^_hn) `il_r[g_jf_]ch_ ``_]nm i`]ihn_rno[fjl_ ^c]n [cfens ih jli]_mmcha nc_g_m+ T il^m [h^ mnlo]nol_m nb[n [l_]ihn_rno[ffs jl_ ^c]n [f_ [l_ nsjc] [ffs jli]_mm_ ^ gil_koc]efs %_+a) ?imnih) E[f_] Hfc_af) M[necf) \$ S[mcmnb] /--58 A_g\la \$ H_ff_l) /--58 J []Aih[f^) M_[lfgonn_l) \$ P_c^_h\la) .6618 J]Aih[f^ \$ Pbcff[i]e) /--08 Qlo_mq_ff) Q[h_hb[om) \$ D[lhm_s) .6618 `il [l_]hn l_pc_q) m_ J []Aih[f^ /-.0&+ Brj_]n[nceih* [m_ ^ jli]_mmcha]h _ [l[nceih[f l_mj ihm_ ni nb_ch_pcn [\f_ oh]_ln[chns chpifp_ ^ ch j[lmcha %Gibh Q+ E[f_] /--.8 I_ps) /--58 K[l[s[h[h \$ Gol`mes) /--1&] [ffiqcha gil_ ``^c]c_hn jli]_mmcha %Pgcmb \$ I_ps) /--.08 `il l_pc_q) m_ Hoj_l\la \$ G[a_l) /-.3&+

Brj_]n[nceih* [m_ ^ jli]_mmcha l[cm_m ko_mnceihm [\ion biq] igjl_b_h^_lm _ [f qcnb mcn[nceihm ch qbc]b nb_cl cgjfc]cn _rj_]n[nceihm ^i hin g[n]b nb_mn[nemnc]m i` nb_fchaoemnc] chjon+ Q[fe_lm,qlc_n_lm] [h ^c``_l ch nb_cl f_rc] [f [h^ mnlo]nol[f jl_`l_h]_m+ I_rc] [f [h^ mshn[]nc] jl_`l_h]_m] [h [fmi ^c``_l \ [m_ ^ ih nb_l_acmn_l %ilg [f pm+ ch`ilg [f& il a_hl_ %m]c_hnc^c] qlcncha pm+ ji_nls&+ Cil_r[g_jf_] j[mcp_ mnlo]nol_m [l_gil_`l_ko_hn ch`ilg [f]] igj[l_ ^ ni ch`ilg [f] l_acmn_lm % T_ch_l \$ I[\ip) .650&+ Lh_ko_mnceih nb_h cm qb_nb_l] igjl_b_h^_lm cahil_ nb_l_mofncha ^c``_l_h]_m ch nb_chjon mn[nemnc]m il qb_nb_l nb_s mig_biq [^domn nb_cl _rj_]n[nceihm niq [l^m nb_mn[nemnc]m i` nb_]oll_hn chjon+ Lh nb_ ih_ b[h^] mo]b _rj_]n[nceih [^ [jn[nceih gcabn l_kocl_ [^cncih[f]iahncp_ [h^ h_ol[f l_miol]_m+ Lh nb_inb_l b[h^] [`cfol_ ni [^domn ih_jm

rj]n[neihm ni q [l^m nb_ MO`aMX mn[nemnc]m] [h [hhof nb_ [^p[hn[a_ nb[n cm [``il^`^ \s _rj_]n[neih*
 \[m^`jli]_mmcha^ nb_ ``c]c_h]s i` _rj_]n[neih*\[m^`jli]_mmcha ^_j_h^m ih nb_ _rn_hn ni qbc]b
 nb_ _rj_]n[neihm l`f_]n nb_ MO`aMX mn[nemnc]m i` nb_ chjon+

Qb_m_]ihme^_l[neihm ginep[n_nb_bsjinb_mcm i` _rj_]n[neih [^[jn[neih^_p_fij_`^ \s Cch_ [h^
]iff_[ao_m %Cch_ _n [f+) /- .0) /- .-&+ Cch_ [h^]iff_[ao_m bsjinb_mct^`^ nb[n]igjl_b_h^_lm
 cgjfc]cnfs [^[jn nb_cl _rj_]n[neihm [\ion nb_ lf[nep_`l_ko_h]s i` qil^m [h^ mnlo]nol_m ch nb_
]oll_hn _hpelihg_hn \[m^` ih nb_ jl_pciomfs _rj_lc_h]^` chjon qcnbch nbcm _hpelihg_hn+ Cil
 r[gjf] [j[lnc]ej[hn ch [h _rj_lc_g_hn qiof^`_hn_l nb_ _rj_lc_g_hn qcnb gil_ il f_mm nsjc][f
 rj]n[neihm \[m^` ih nb_ lf[nep_`l_ko_h]s i` fchaoemnc] mnlo]nol_m ch jl_pciomfs _rj_lc_h]^`
 chjon+ ?on [m nb_ _rj_lc_g_hn jlial_mm_m) j[lnc]ej[hn g cabn [^[jn nb_cl _rj_]n[neihm `il nb_]oll_hn
 _hpelihg_hn \[m^` ih nb_ lf[nep_`l_ko_h]s i` nb_ fchaoemnc] mnlo]nol_m UZ `TQ UZ`a`^QOQubQP _f RM^
 Pa^UZS `TQ Qd\Q^UYQZ+ Qbcm [^[jn[neih cm bsjinb_mct^`^ ni jli]_`^ \s ch]l_g_hn[ffs [h^ l[neih[ffs
 chn_al[ncha jlciil _rj_]n[neihm %il) ch ?[s_mc[h _nlgchifias) jlciil _fc`m& qcnb nb_ i`m_lp[neihm
 g[^`_ch nb_]oll_hn _hpelihg_hn) f_[^cha ni [^[jn^` jimm_lciil _rj_]n[neihm _fc`m [^`_n_l_]b h_q
 l_f_p[hn i`m_lp[neih+ T_`_g j b[mct_`nbcm jichn [m cm i` ^cl_]n l_f_p[h]_ ni nb_ chn_ljl_n[neih i` nb_
 mno^s q_ l_mjih^` ni b_l_7 [^[jn^` _rj_]n[neihm [l_jl^`c]n^` ni l`f_]n [q_cabn^`]ig\ch[neih i`
 i`m_lp[neihm g[^`_ch nb_ jl_m_hn _hpelihg_hn [h^`_rj_]n[neihm \[m^` ih l_f_p[hn jl_pciom
 f[hao[a_ _rj_lc_h]_+ O[neih[f _rj_]n[neih [^[jn[neih jl^`c]nm nb[n []igjl_b_h^_l_m _fc`m [\ion
 nb_ jli][\cfens i` [mnlo]nol_ch [acp_h fchaoemnc]]ihn_rn) j_jimm_lciil%mnlo]nol_u]ihn_rn&)[l_`^oh]neih
 i`7

%c&A nb_ lf[nep_ jli][\cfens i` nb[n mnlo]nol_ch nb[n]ihn_rn ch nb_]igjl_b_h^_l_m
 f[hao[a_ _rj_lc_h]_ jlciil ni nb_ _rj_lc_g_hn) j_jlciil%mnlo]nol_u]ihn_rn&)
 %cc&A nb_ lf[nep_ jli jilneih i` i]]oll_h]_m i` nb_ mnlo]nol_ch nb_ l_f_p[hn]ihn_rn qcnbch
 nb_ _rj_lc_g_hn mi` [l]]iohn%mnlo]nol_)]ihn_rn& ,]iohn%]ihn_rn&)
 %ccc&A nb_ mnl_hanb i` nb_ jlciil _fc`m [m nl[hm`_ll^` ni nb_]oll_hn _rj_lc_g_hn) [h^
 %cp&A nb_ [\mifon_hog`_l i` ncg_m nb_ l_f_p[hn]ihn_rn b[m _h i`m_lp^` qcnbch nb_
 _rj_lc_g_hn)]iohn%]ihn_rn&

qb_l_ %ccc& [h^`_cp& nia_nb_l ^`_n_lgch_ nb_ lf[nep_ q_cabncha i` %c& jlciil _fc`m [\ion nb_
 lf[nep_ jli][\cfens i` mnlo]nol_m [a[chmn %ccc& nb_ chjon`li g nb_ jl_m_hn _hpelihg_hn qcnb %ccc& _cha
 nb_ ihfs ^`_al_ i` _l^`ig) [m q_ _f[il[n_ _fi q&+ ?[s_mc[h _fc`^oj^`[ncha jlipc^`_m [q[s ni
 gi^`_f l[neih[f _rj_]n[neih [^[jn[neih) g[echa cn jimm_c`f_ni]igjl_bog[h jli]_mmcha _b[pcil
 [a[chmn nb_ jl^`c]neihm i` [hilg[nep_ gi^`_f %?ombiha) ?ol]bfff) \$ G[_a_l) h^`+8 Cch_ _n [f+) /- .-8
 Hf_chm]bgc^`n Cch_) \$ G[_a_l) /- .78 J smfwh \$ I_ps) /- .3&+ Qb_ bsjinb_mcm i` _rj_]n[neih
 [^[jn[neih nbom] ihmnenon_m [bsjinb_mcm [\ion \inb cTe [h^`T/c_l]_hn _rj_lc_h]_ [``_]nm f[hao[a_
 jli]_mmcha %`ill_f[n^` jlijim[fm]m_ [fmi @b[ha) A_ff) \$?i]e) /- -38 A_ff \$ @b[ha) /- .08 D[lli^`
 \$ Mc]e_lcha) /- -68 G[_a_l \$ Phc^`_l) /- .08 O_cnn_l) H_ff_l) \$ J_iil_) /- .&+
 E_l_) q_`_i]om ih nb_ nqi_l_ [^cha _rj_lc_g_hnm ^`_m]lc`_`_ch C.0 [h^` nb_]ih`fc]ncha _pc^`_h]_

ch [l_]_hn f[la_*m][f_l_jfc][neih [nn_gjn \s EP.5+ T_`_g j b[mct_) biq_p_l) nb[n mojjiln`il
 rj]n[neih [^[jn[neih hiq]ig_m`lig [hog`_l i` mno^`_m ih mjie_h [h^` pcmo[f f[hao[a_
 jli]_mmcha %C[lg_l) Cch_) V[h) @b_cg[lcio) \$ G[_a_l) /- .18 Cch_ \$ G[_a_l) /- .3[8 Cch_ _n [f+]
 /- .-8 Cl[oh^`il^` \$ G[_a_l) /- .38 H[gc^`_] /- .78 H[m]b[e) /- -38 H[m]b[e \$ Df_h\la) /- -18
 Osmech) Nc) Ao`) \$?liqh*P]bgc^`n) /- .48 V[h) C[lg_l) \$ G[_a_l) /- .5&]ch]fo^`cha mi_g_mno^`_m
 nb[n b[p_ _aoh ni c^`_hnc`_s nb_ jin_hnc[f fcg_cnm i` mo]b [^[jn[neih %Ico) ?ol]bfff) Q[h_hb[om) \$
 G[_a_l) /- .48 ihaicha qile \s O[]b_f Osmech [h^` P[l[b ?liqh*P]bgc^`n&+ Pch]_ nbcm \i^`s i`
 _pc^`_h]_ cm f[la_fs hin_g_hncih^`_ch EP.5) q_ ch]fo^`_mog g[lc_m _fi q+

‘ T_om_]]ihn_rn) nblioabion ni l`_l_mncl]nfs ni nb_ XUZSaU`_UO]ihn_rn ch qbc]b)m[s] [qil^` il mshn[]nc
 mnlo]nol_i]]olm+]Bhpelihg_hn) \s]ihnl[mm]]l_jnol_m ch^`_rc][fp[lc[\f_m mo]b [m n[fe_l) _rj_lc_g_hn) a_hl_)
 l_acnn_l)_n]+ %`ill_f[n^` ^cm]ommcih [\ion nb_ lf[neih _n_q_h]]ihn_rn [h^` _hpelihg_hn) m_ Cch_ _n [f+] /- .08
 Hf_chm]bgc^`n \$ G[_a_l) /- .28 Nc[h _n [f+] /- .7&

<FOCC NR?IGQ?Q6SC MOCBAQ6LKP LD CUMCAQ?Q6LK ?B?MQ?Q6LK

Qb_ l_[^cha _rj_lc_g_hnm ch C.0 [h^ EP.5 chp_mnca[n_]b[ha_m ch mi*][ff^ SM^PQZ \M^T
``]nm { mfi q*^i qhm ch l_[^cha nc_g_m qb_h_n_g_jil[lcfs [g\caoiom m_hn_h]_ ihm_nm [l_
^cm[g\cao[n_^ ni q[l^m nb_ XQ_ _rj_]n_^ j[lm_ { nblioab nb_]iolm_i` [h _rj_lc_g_hn+ Qb_
g [ahcno^_ i` mo]b a[l^_h*j[nb_``_]nm b[m_h fche_ ni nb_l_f[nep_ _rj_]n_^ h_mm i` nb_j [lm_7 nb_
f_mm _rj_]n_^ nb_j [lm_] nb_f[la_l nb_mfi q*^i qh ch l_[^cha nc_g_m [n nb_ ^cm[g\cao[ncih jichn %_+a)
D[lhm_s) M_[lfgonn_l) J s_lm) \$ I ini]es) .6648 J]O[_] Pjcp_s*Hhi qfnih) \$ Q[h_hb[om) .6658
Tcfmih \$ D[lhm_s) /--6&+ Qbcm g[e_m a[l^_h*j[nb_m_hn_h]_m [mocn[\f_n_mm _^`il nb_mno^s i`
cg jfc]cn]b[ha_m ch _rj_]n[ncihm+

Pj_]c`c)[ffs) nb_ _rj_lc_g_hnm ch C.0 [h^ EP.5 `i]om ih nb_ a[l^_h j[nb [g\caocns ch %.&]
_n_q_h [g[nlcr p_l\ % J S& [h^ [l_^o]_ _l_f[nep_]f[om_ %O@&]ihncho[ncih+ Qb_n_g_jil[ls
[g\caocns ch %.& mn[lm [n nb_ [g\caoiom p_l\ `ilg cM^ZQP [h^ cm _h^_ [n nb_ ^cm[g\cao[ncih
jichn { NQR/^Q ch %.[& il O/ZPaO`QP ch %.\&+

%.& Qb_ _rj_lc_h]_^ mif^c_lm cM^ZQP MN[a` `TQ PMZSQ^_ y
[+ ++ _`il_nb_ gc^hcabn l[c^+ %^cm[g\cao[ncih ni q[l^m J S&
\+ ++]ih^o]n_^ nb_ gc^hcabn l[c^+ %^cm[g\cao[ncih ni q[l^m O@&

%/&
[+ Qb_ _rj_lc_h]_^ mif^c_lm mjie_ [\ion nb_ ^[ha_lm _`il_nb_ gc^hcabn l[c^+
%oh[g\caoiom J S&
\+ Qb_ _rj_lc_h]_^ mif^c_lm qbi q_l_nif^ [\ion nb_ ^[ha_lm]ih^o]n_^ nb_ gc^hcabn l[c^+
%oh[g\caoiom O@&

@ihncho[ncihm fce_ %.\&]ihmcmn_hnfs_fc]cn qb[n cm eh iqh [m [g\caocns il a[l^_h*j[nb_``_]nm7
l_[^cha nc_g_m mjce_ [n nb_ ^cm[g\cao[ncih jichn %_+a) O/ZPaO`QP g ch %.\&& qb_l_nb_ [g\caocns cm
l_mifp_ ^ni q[l^m nb_l_f[nep_]f[om_ chn_ljl_n[ncih)]i gj[l_ ^ni oh[g\caoiom O@m %/\& %C+ C_l_l_cl[
\$ @fc`nih) .6538 J []Aih[f^ Gonn) \$ @ [lj_hn_l) .66/8 Q[\imnc) Pjcp_s*Hhi qfnih) J]O[_] \$
Q[h_hb[om) .6618 Qlo_mq_ff_n [f+] .661&+ Ki mo]b [g\caocns ``_]n cm `ioh^ [n nb_m[g_l_acih`il
[g\caoiom]i gj[l_ ^ni oh[g\caoiom J Sm) _+a) ih NQR/^Q g ch %.[&]i gj[l_ ^ni %/[&+
Brj_]n[ncih*[\m_ ^[]]iohnm [nnc\on_nbcm [g\caocns ``_]n ni nb_`[]n nb[n nb_ [g\caoiom p_l\ `ilg
cM^ZQP cm ip_lqb_fgchafs g il_fce_fs ni i]]ol qcnb J Sm %34# i` nb_nc_g_ nb[h O@m %5#& ch
l_[^_lm; jl_pciomf[hao[a_ _rj_lc_h]_ %[\m_ ^ih Oif[h^ Ac]e) \$ Bfg [h) /--4&+ >]]il^cha ni nb_m_
[]]iohnm) nb_mfi q*^i qh ch l_[^cha nc_g_m [n nb_ ^cm[g\cao[ncih jichn cm [`oh]ncih i` nb_l_f[nep_
^_al_ i` _rj_]n[ncih pef[ncih nb_jl^c]ncih_lil ch nb_m_hm_ i`) _+a) A_ff \$ @b[ha) /-.08 Cch_
\$ G[_a_l) /-.0&+ Fh fch_ qcnb nbcm jl^c]ncih) nb_g [ahcno^_ i` nb_ [g\caocns ``_]n { c+_)nb_mfi q*
^i qh [n nb_ ^cm[g\cao[ncih l_acih { b[m_h `ioh^ ni _mg [ff_l`il [g\caoiom p_l\ `ilgm nb[n
[l_f_mm \c[m_ ^ni q[l^m nb_ J S]ihncho[ncih ch_p_ls^[s f[hao[a_ om_ %_+a) E[l_l) Q[h_hb[om) \$
J]O[_] /--4&+

Qbcm) Cch_ [h^]iff_[ao_m [lao^) g[e_m nb_ g [ahcno^_ i` [a[l^_h*j[nb_``_]n [_b[pcilf
mcah[nol_ i` nb_l_f[nep_ %oh&_rj_]n_^ h_mm i` O@m [h^ J Sm [n nb[n jichn ch nb_ _rj_lc_g_hn+ Qbcm ch
nolh g[e_m cn jimme\ f_ni n_mm qb_nb_l]i gjlb_h^_lm; _rj_]n[ncihm `il_cnb_l mnlo]nol_ OTMZSQ
nblioabion nb_ _rj_lc_g_hn+ Pj_]c`c)[ffs) Cch_ [h^]iff_[ao_m n_mm ^nbl_ ko[fc[nep_ jl^c]ncihm i`
rj]n[ncih [^ [jn[ncih+ Qb_ `clmn nqi jl^c]ncihm ^cl_nfs `iffi q`lig nb_c^_ [nb[n]i gjlb_h^_lm
ch]l_g_hn[ffs [^ [jn nb_cl _rj_]n[ncihm ni q[l^m nb_mn[ncmnc)m i` [hip_f_hpclihg_hn [m nb_s [l_
_rj_im_ ^ni cn7

80CBAQ6LK '+ Tcnb mo`c]c_hn l_j_[n_^ i\m_lp[ncihm i` [h M \^U/^U bcabfs oh_rj_]n_^
mnlo]nol_ { mo]b [m O@m ch]ihn_rnm fce_ %.& [\ip_ { nb_molj]cm[f i` nb_M \^U/^U _rj_]n_^
mnlo]nol_ { mo]b [m J Sm { mbiof^ _p_hno[ffs ch]l_[m_mi go]b nb[n]i gjlb_h^_lm hi q a[l^_h j[nb
`il nb_M \^U/^U _rj_]n_^ mnlo]nol_+

80CBGAQGLK (+ >n nb_m[g_ nc g_) nb_moljlc[mf i` nb_M \^U/^U bcabfs oh_rj_]n^ mlo]nol_ qcff
^_]l_[m_] nbom l_o]cha [hs a[l^_h j[nb _`_]nm`il nb[n mlo]nol_+

Tcnb mo`c]c_hn _rjimol_ qcnbch [h _rj_lcg_hn) cn mbiof^ nbom _ jimme\ f_ ni [^j[n
]i g jl_b_h^_lmj_hplihg_hn*mj_]c`c] _rj_]n[ncihm ni _ ij jimen_ i` M \^U/^U _rj_]n[ncihm \[m_
ih_p_ls^[s f[hao[a_chjon+ Qb_nbl^ j_l^c]neih n_mn^ \s Cch_ [h^]iff_[ao_m lf[n_m ni nb_c^_
nb[n ihfs ^QXQbMZ' i\m_lp[ncihm mbiof^ [``_]n [acp_h_rj_]n[ncih`il [mj_]c`c] mlo]nol_7

80CBGAQGLK)+ %>`n_l ^cm]iohcha `il]b[ha_m ch l_[^cha mj__^ ^o_ ni ohl_f[n_^`[]nilm& nb_
g[ahcno^_ i` nb_a[l^_h j[nb _rj_lcg_hn]^ ih [h M \^U/^U ch`l_ko_hn mlo]nol_ mbiof^ ihfs ^_j_h^
ih i\m_lp[ncihm nb[n mj_]e ni nb_l_f[nep_`l_ko_h]s i` O@m [h^ J S m ch nb_l_f_p[h n]ihn_rnm+ Qbom)
nb_hog_l i` chn_lp_hcha`cff_lm) qbc]b^i hin jlipc^_ fchaocmnc]]ihn_rnm nb[n ch`ilg nb_l_f[nep_
jli\[\cfns i` O@m [h^ J S m ch]ihn_rnm fce_%.&) mbiof^ Z/[``_]n nb_g[ahcno^_ i` nb_a[l^_h
j[nb+ K_rn) q_mog g[let_bi q Cch_ [h^]iff_[ao_m m_n ion ni n_mn nb_m_ nbl_ j_l^c]neihm+

;R J J ?OV LD QFC LOGEGK?I PQRBV+ 2GKC# 4?CECO# 2?O JCO# ?KB 9G?K !(&'")

Fh il`l ni n_mn j_l^c]neihm [\ ion c g jfc]cn _rj_]n[ncihm) il]b[ha_m nb_l_i`) cn cm [fmi_h_]mm[ls
ni g[e_]mmog jncihm [\ ion bi q nb_m_ _rj_]n[ncihm fche ni i\m_lp[\f_g_[mol_m i` jli]_mmcha
^c`c]ofns+ >fibioab hin]lcnc][f ni nb_ bsjinb_mcm i` _rj_]n[ncih [^j[n[ncih) Cch_ [h^]iff_[ao_m
[mmog_^[f ia*_l]c]li][f %moljlc[mf& fche _n_q_h _rj_]n[ncihm [h^ l_[^cha nc g_m ^olcha m_f*j[]_ ^
l_[^cha %?imni_h_n [f+) /--58 A_g_la \$ H_ff_l) /--58 Cl[he \$?i^)/--.8 Gibh Q+ E[f_] /--.8
I_ps) /--58 Icht_h \$ G[_a_l) /-.28 P_gcnb \$ I_ps) /-.0&+ E_l_q_`iffi q nbcm [mmog jncih+ Fh^_ ^)
[m q_mbi q f[n_l) nb_ ^[n[`li g EP.5 [h^ C.0 _rbc\cn [fg imm c^_hnc][f ch]l_[m_m ch OQm`il _[]b .
\cn ch]l_[m_m ch moljlc[mf+

Cch_ [h^]iff_[ao_m j_l_m_hn nqi m_f*j[]_ ^ l_[^cha _rj_lcg_hnm ^_mcah^_ ni n_mn nb_ nbl_
j_l^c]neihm ionfch^ ch nb_ j_l_pciom m_]ncih+ Qb_s `ioh^ [ff nbl_ j_l^c]neihm mojjiln^ \s nb_cl
^[n[]nbioab nb_ mnl_hanb i` nb_ mojjiln p[lc^_ _n_q_h nb_ nbl_ j_l^c]neihm+ Brj_lcg_hn .
_g_jfis^ [/r/ qcnbch*j[lnc]cj[h n ^_mcah)_rjimcha j[lnc]cj[hnm ni [ohc`ilg g_ernol_ i` 2- # O@m
[h^ 2- # J S m) b[f i` _[]b qcnb nb_ nsj_ i` n_g_jil[ls [g\caocns nbiqu ch %.& [\ip_ [h^ b[f
qcnbion+ Pno]nol_ [h^ [g\caocns q_l_l[h^ i gfs ^cmnl_\on^ _[]limm nlc[fm [h^]iohn_l^\[f[h]_ ^
[]limm j[lnc]cj[hnm pc[I[nch*mko[l_ ^_mcah) qcnb`eff_lm chn_lm_j_lm^ _n_q_h]lcnc][f O@ [h^ J S
cn_gm+ Ccaol_ . nbiqu nb_ ^_mcah [h^ nb_]iill_mjih^cha j_l^c]n^]b[ha_i` O@ [h^ J S moljlc[mf
[]limm nb_]iolm_ i` nb_ _rj_lcg_hn+ Qb_hog_lc][f j_l^c]neihm [l_ ^_lcp_ ^_li g [?[s_mc[h _fc`*
oj^ [ncha g i^_f`clm chnli^o]_ ^`il nbcm joljim_ ch Cch_ _n [f+ %/- .-&) [h^ ^_m]lc\^ f[n_l ch nbcm
[lnc]f+ Cil hi q) nb_ joljim_ i` nbcm pcmo[fet[neih cm g_l_fs ni jlipc^_ l_[^_lm qcnb [h chnoenci i`
nb_ j_l^c]n^ nlc[f*s*nlc[f _`_]nm i` _rj_]n[ncih [^j[n[ncih+ Ciffiqcha Cch_ [h^]iff_[ao_] q_
[mmog_nb[n j[lnc]cj[hnm j_lcil_rj_]n[ncihm [n nb_ _achhcha i` nb_ _rj_lcg_hn l_f_]n nb_l_f[nep_
jlijilncih i` O@m %v+-5& [h^ J S m %v+34& ch h[nol[f f[hao[a_om_+ Qb_m_ _mnc g[n_m l_ i\n[ch_ ^
`lig [f[la_m[g_jf_ i` [onig[nc][ffs j[lm_ ^_qlcm_h ?lncmb Bhafcmb %Oif[h^ _n [f+) /--4&) [h^ [l_
nbom _mn nbioabn i` [m]iolm_*al[ch_ ^ [jjlireg[neih i` nb_ O@, J S mn[ncmnc]m nb[n [h [p_l[a_
%>g_lc][h Bhafcmb mj_[echa& j[lnc]cj[h n b[m _rj_lcg_hn]_ ^+

L`hin_ch Figure 1 is that RC surprisal is predicted to change much more than MV surprisal.
As we show later, this is a direct consequence of the fact that RCs, compared to MVs, are
unexpected based on everyday language experience, ; 262YS !' , , and thus highly surprising at
the beginning of the experiment, 262YS R A i F ; 262YS *!- + , H E We return to this asymmetry
below, as it is of relevance to understanding when expectation adaptation is predicted to lead to
detectable behavioral signatures.

''' Ccaol_ . >MMOLUF J >QBIV EBOB '''

<USa^Q) : Q USZ #_TMPQP NM^_ \$ MZP \^QPVO^QP OTMZSQ_ UZ G9 MZP BK _a^ \^U_MX #XUZQ_ \$ [bQ^ `TQ
O[a^_Q [R `TQ Qd\Q^UYQZ` R[^ ; d\Q^UYQZ`) UZ <UZQ Q` MX' #*()+\$' 8M^ _T[c _QZ^QZQ0 `e\Q_ `TM` \M^`UOU\MZ`_
c [a^P ^QMP UZ [ZQ [R `TQ AM^UZ&_]aM^Q PQ_ USZ _QaP [k^MZP [YUfQP XU_ _' ITQ Y [PQX R^ [Y c TUOT `TQ \^QPVO^U [Z_
M^Q PQ^UbQP U_ `TQ _MYQ M_ UZ <UZQ Q` MX' #*() (\$ MZP PQ_ O^UNQP NQX [c' 7X^T [aST TM^P ` [PU_OQ^Z UZ `TU_ \X [^%
BK _a^ \^U_MX U_ _X [cXe UZO^QM_ UZS `T^ [aST [a^ `TQ Qd\Q^UYQZ`'

Fh fch_ qcnb Ccaol_ .) C.O `ioh^ [mcahc`c] [hn ^_] l_[m_ ch nb_ [g \caocns _`_] n`il O@m] [h^ [h
chmcahc`c] [hn UZ] l_[m_ ch nb_ [g \caocns _`_] n`il J S m+ Qb_ ^_] l_[m_ ch nb_ a [l^_h j [nb _`_] n`il
O@m q [m l_jfc] [n^_ ch nbl_ _m_f*j [] _^ l_[^cha _rj_lcg_hnm qcnb nb_ m [g_ ^_mcah [h^ ^c` _l_hn
g [n_lc[fm] l_jiln^_ ch @l[s] l[^n % / - .1&+ Qb_ m [g_ _`_] n q [m [fmi l_jfc] [n^_ ch nbl_ _s_*nl [] echa
l_[^cha _rj_lcg_hnm qcnb nb_ m [g_ ^_mcah [h^ ^c` _l_hn cn_gm l_jiln^_ ch %V[h _n [f+] / - .5&+ Qb_
^_] l_[m_ ch nb_ a [l^_h j [nb _`_] n`il O@m q [m [fmi i _m_lp^_ ch nbl_ _olnb_l m_f*j [] _^ l_[^cha
_rj_lcg_hnm ih ihfs O@m l_jiln^_ ch Cch_ [h^ G[_a_l] %Cch_ \$ G[_a_l] / - .3[&+ >^cncih[f] ih] _jno[f
l_jfc] [ncihm i` nbcm `ch^cha { l_ ^o] ncih ch a [l^_h*j [nb _`_] nm`il [h M \^U/ ^U oh_rj_] n^_ mnlo] nol_
qb_h cn cm i _m_lp^_ go] b gil_ `l_ko_hnfs ch nb_]oll_hn _hpclihg_hn {]ig_ `lig l_[^cha
_rj_lcg_hnm ih inb_l mshn []nc] mnlo] nol_m % +a+ Cch_ \$ G[_a_l] / - . .8 Cch_ _n [f+] / - . -8 Cl[oh^il` \$
G[_a_l] / - .38 H[m] b[e] / - -38 H[m] b[e \$ Df_h_`la) / - -18 T_ffm] @blcmnc[hm_h) O[] >]b_mih) \$
J [] Aih[f^) / - -6&+ Qia_nb_l) nb_ _pc^_h] _i` ip_l _- m_f*j [] _^ [h^ _s_*nl [] echa l_[^cha
_rj_lcg_hnm ih nbl_ _^c` _l_hn mshn []nc] mnlo] nol_m jlipc^_m mnliha mojjiln `il ML^c] ncih / +

C.O; m `clmn _rj_lcg_hn [fmi jlipc^_m mig_ mojjiln `il ML^c] ncih . { [hog_lc] [f] \on
chmcahc`c] [hn] UZ] l_[m_ ch nb_ [g \caocns _`_] n`il nb_ M \^U/ ^U gil_ _rj_] n^_ J S mnlo] nol+ I [n_l
mno^c_m ih nb_ O@, J S [g \caocns qcnb nb_ m [g_ ^_mcah b[p_ l_jfc] [n^_ nbcm hog_lc] [f nl_h^
% @l[s] l[^n] / - .18 V[h _n [f+] / - .5&+ Lh nb_ ih_ b[h^) cn cm hin moljlcma nb[n nbcm nl_h^ `il J S
a [l^_h j [nbm ihfs mbiqm hog_lc] [ffs7 nb_ bsjinb_mcm i` _rj_] n[ncih [^[jn[ncih \^QPVO^_ [p_ls
mg [ff] b[ha_ch J S moljlcma [f]]i gj [l^_ni O@ moljlcma [f] nblioabion nb_ _rj_lcg_hn %m_ nb_l^
fch_ch Ccaol_ .&+ K_p_lnb_f_mm) nbcm j [nn_lh [lao[\fs]ihmncnon_m q_[e_l mojjiln `il ML^c] ncih .)
]i gj [l^_ni nb_l_j_ [n^_ [h^] f_ [l_l_jfc] [ncih i` ML^c] ncih / +

Qi jon ML^c] ncih . ni [mnliha_l_n_mn) C.O]ih^o] n^_ [m_] ih^ m_f*j [] _^ l_[^cha _rj_lcg_hn
ih nb_ O@, J S [g \caocns+ Qbcm m_] ih^ _rj_lcg_hn_g_jfis^_ [_nq_ _h*j []nc] cj [hn ^_mcah+ Ccaol_
/ %nij& cffomnl [n_m nb_ mncgofc m_h \s nb_ nqi _rjimol_ aliojm] [h^ nb_] ill_mjih^cha jl^c] n^_
]b[ha_m ch moljlcma [f+ Fhpemc _ni j []nc] cj [hnm] nb_ _rj_lcg_hn]ihmcmn^_ i` nbl_ \fi] em+ Qb_ O@*
Cclmn alioj l_[^ ihfs O@m ch ?fi] e .) [nin[f i` .3 O@m+ Qb_ Ceff_l*Cclmn alioj l_[^ ihfs `cff_lm
% [fmi .3&+ Fh ?fi] e /) \inb aliojm l_[^ _- O@m chn_lm_j_lm^_ qcnb / - `cff_lm+ Fh ?fi] e 0) \inb aliojm
l_[^ _- J S m chn_lm_j_lm^_ qcnb .2 `cff_lm] l_mofncha ch [nin[f i` 4. m_hn_h] _nle[fm []limm nb_ _hncl_
_rj_lcg_hn+ E[f i` nb_ J S, O@m ch _[]b \fi] e]ihn[ch^_ nb_ [g \caocns] b[f ^c^ hin+ Qbcm q [m
]iohn_l^* \ [f[h] _^ []limm j []nc] cj [hnm omcha [I [nch*mko [l_ ^_mcah+

<USa^Q * : Q_USZ #_TMPQP NM^_ \$ MZP \^QPuO`QP OTMZSQ_ UZ G9 MZP BK _a^\^U_MX #XUZQ_\$ [bQ^ `TQ
 O[a^_Q fR `TQ Qd\Q^UYQZ` R[^ ; d\Q^UYQZ` * UZ <UZQ Q` MX' #*()+\$% EMZQX 7% MZP >M^U^ZS`[Z H`MOW Q` MX' #*()O\$%
 EMZQX 8' E^QPuO`U[Z_ R[^ _^a0`a^Q_ `TM` M^Q Z[^ \^Q_QZ` UZ M NX[OW% MZP `Ta_ OMZZ[^ NQ `Q_`QP UZ `TM` NX[OW%
 M^Q _T[cZ PM_TQP' 9^U`UOMX MZP RUXXQ^ ^UMX_ `TM` >M^U^ZS`[Z H`MOW Q` MX' #*()O\$ ^QY[bQP R^[Y MZMXe_U_ M^Q
 _T[cZ UZ cTU`Q'

Qbcm ^_meah [``il^m ko[fcn[nep_ n_mmm i` [ffnbl__jl_^c]neihm g[^_ [\ip_+Fh fch_ qcnb ML_^c]neih
 .) C.O l_jiln_ ^ []f_[lfs meahc`c][hn [g\caocns _`_]n`il J Sm ch ?fi]e 07 [n_l l_j_[n_^_rjimo_l_
 ni nb_ M \^U/\^U f_mmm `l_ko_hn O@ mnlo]nol_) ^cm[g\cao[neih ni q[l^m nb_ J S mnlo]nol_ f_^ ni nb_ nsj_
 i` jli_]mmcha mfi q*^i qh nsjc][ffs [mmi]c[n_^ qcnb O@m+ Qbcm g[ch _`_]n i` [g\caocns []limm nb_
 nqi _rjimo_l aliojm]iof^ bi q_p_l) _]ih`ioh^ ^7 C.O ^c^ hin]ih^o]n []ihnlif]ih^cncih ch
 qbc]b \inb ?fi]em . [h^ / b[^ihfs `cff_l_m+ Fn cm nbom oh]f_[l qb_nb_l nb_ J S mnc gofc ch ?fi]e 0
 domn b[jj_h_^ ni _rbc\cn a[l^_h j[nb _`_]nm _][om_ i` nb_cl f_rc][f jlij_lnc_m) il qb_nb_l nb_s
 rbc\cn^ nb_ a[l^_h j[nb _][om_ i` nb_jl_] ^cha _rjimo_l ni O@m+ @lenc][ffs] C.O [fmi `ioh^ [f
 meahc`c][hn chn_l[]neih _nq_h [g\caocns [h^ _rjimo_l alioj `il ?fi]e 07 Qb_ a[l^_h*j[nb `il
 J Sm ch ?fi]e 0 q[m f[la_l`il j[lnc]cj[hnm qbi b[^m_h g il_ O@m ch ?fi]em . [h^ / %nb_ O@*clmn
 alioj&)]i g j[l_^ ni j[lnc]cj[hnm ch nb_ Ceff_l*clmn alioj+ Qbcm jlipc^_^ g il_ ^]cmcp_mojjiln `il
 ML_^c]neih .+

C.Ojm Brj_lcg_hn / [fmi jlipc^_^ [^^cncih[f mojjiln `il ML_^c]neih /) [h^ chenc[f mojjiln `il
 ML_^c]neih 0+ Fh mojjiln i` ML_^c]neih /) C.O `ioh^ nb[n nb_ [g\caocns _`_]n ih O@m ^_]l[_m^
 nblioabion ?fi]em . [h^ ?fi]e / ch nb_ O@*clmn alioj+ Qbcm ^_]l[_m_ q[m meahc`c][hn ch [nlc[f*
 f_p_f [h[fsmcm nb[n f_n mnlo]nol_) [g\caocns] [h^ nb_cl nqi*q[s chn_l[]neih chn_l[]n qcnb cn_g il^_l
 %nb_ hog_l i` O@m i\m_lp_^ ch nb_ jl_] ^cha mnc gofc&+ Qb_ _`_]n ^c^ bi q_p_l) hin l_]b
 meahc`c][h]_ ch [g il_]i[lm_*al[ch_^ \fi]e*f_p_f [h[fsmcm nb[n]i g j[l_^ nb_ [g\caocns _`_]n ih
 O@m ch ?fi]e . [a[chmm ?fi]e /+ Dcp_h nb[n nb_ \fi]e*f_p_f [h[fsmcm b[m f_mm j i q_l) [h^ acp_h nb[n
 ML_^c]neih / b[m hi q _h]ih`clg_^ \s [f[la_hog_l i` mmo^c_m) q_ ^i hin ^cm]omm nbcm `olnb_l
 %ch]f+ EP.5) m_ _fi q&+

Cch[ffs] ch mojjiln i` ML_^c]neih 0) C.O `ioh^ nb[n nb_ [g\caocns _`_]n ih O@m ch ?fi]e / q[m
 g[lach[ffs mg[ff_l`il nb_ O@*clmn alioj]]i g j[l_^ ni nb_ Ceff_l*clmn alioj % \: +5&+ Pch]_ \inb
 aliojm i` j[lnc]cj[hnm l[_^_ko[ffs g[hs m_hn_h]_ nlc[fm jl_] ^cha ?fi]e /) [h^_ko[ffs g[hs O@m
 % [h^ `cff_lm& ^olcha ?fi]e /) nbcm ^c`_l_h_] [hhin _ _rjf[ch_^ \s [^[jn[neih ni nb_ _rj_lcg_hn]f
 n[me+

;RJJ?0VLD ;Q?AH 3?00%KEQLK# 4?JCP#?KB >?QPLK !(&'*

EP.5jm`clmn_rj_lcg_hn q[m chn_h^_^ [m[h_rn_hmcih \[_m^ ih nb_ ^_meah i` C.Ojm Brj_lcg_hn
 . \on`[cf_^ ni l_jfc][n_nb_ \[mc] l_^o]neih i` nb_ O@ [g\caocns _`_]n i\m_lp_^ ch C.O %ML_^c]neih

/&+ T_ ^i hin ^cm]omm EP.5im Brj_lcg_hn . `olnb_l b_l_7 ch [^^encih ni C.0 %Brj_lcg_hn . [h^ /& nb_l ^o]ncih ch nb_ O@ [g\caocns _`_]n b[m _h mo]]_mm`offs l_jfc][n_ ^ ch [n f_[mn n_h inb_l _rj_lcg_hnm omcha \inb_m_f*j[_] ^ l_[^cha %@l[s]l[^n) /- .18 C[lg_l) Cch_) \$ G[_a_l) /- .8 Cch_ \$ G[_a_l) /- .3 [& [h^ _s_*nl[]echa l_[^cha j [l[^cagm %C[lg_l _n [f+) /- .18 V[h _n [f+) /- .5&+ Fh^ _^) MXX mcr [nn_g jnm ni l_jfc][n_nbcm _`_]n ch iol f[\ b[p_ `ioh^ cn) [h^ m_p_l[f i` nb_m_mno^c_m [lao[\fs b[^bcab_l j i q_l nb[h EP.5im Brj_lcg_hn . +>ff i` nb_m _rj_lcg_hnm b[^mcgcf[l hog _lm i` cn_gm [h^ j [lnc]cj[hnm [m EP.5im Brj_lcg_hn . +>]limm mno^c_m) l_jfc][ncihm i` C.0im Brj_lcg_hn .]ip_l [p[lc_ns i` ^c` _l_hn cn_gm [h^ [^^encih[f]ihnlifm+ Qbcm ch]fo^_m]iohn_l[f[h]cha i` cn_g il^_l [h^ cn_g c^_hncns []limm _rj_lcg_hn[f fcmnm %@l[s]l[^n) /- .18 Cch_ \$ G[_a_l) /- .3 [&+ Qb_m_l_jfc][ncihm nbom [pic^]ih`ioh^cha _`_]nm i` _rj_]n[ncih [^j[n[ncih qcnb q_ff^*^i]og_hn ^ cn_g _`_]nm \[m_ ^ ih) `il _r[g jf_) nb_ cn_gim g[nlcr p_l\ %E[l _n [f+) /- .48 J]O[_ _n [f+) .6658 Qlo_mq_ff _n [f+) .661&+ Qbcm]ihnlif q[m [\m_hn ch Brj_lcg_hn . i` \inb C.0 [h^ EP.5+ Fh mbiln) cn cm p_ls fce_fs nb[n EP.5im Brj_lcg_hn .]ihmncnon_m [Qsj_FF_llil %` [fm_h_a[nep_&+

T_nbom`i]om ih EP.5im_m_]ih^ _rj_lcg_hn) qbc]b [fmi `ilgm nb_ \ofe i` nb_cl [laog_hn[ncih+ Qbcm _rj_lcg_hn `iffi q_ ^ nb_m [g_ _nq_ h*j [lnc]cj[hn ^_mcah [m C.0im Brj_lcg_hn / \on om_ ^ nqc]_ [m g [hs cn_gm ch _[]b \fi]e [m q_ff [m [\ion `cp_ nc_gm [m g [hs j [lnc]cj[hnm %m_ Ccaol_ /&+ EP.5 [h[fst_ ^ nb_cl ^[n[omcha nb_m [g_ \fi]e*f_p_f [h[fsm_m nb[n]ihmncnon_ ^ nb_ jf[hh_ ^ [h[fsmcm ch C.0+ EP.5 `ioh^ nb[n nb_ [g \caocns _`_]n `il O@m _^]l[m_ ^ `li g ?fi]e . ni ?fi]e / ch nb_ O@*clmn alioj+ T_b_l_[m nbcm _`_]n q [m ihfs g [lach[f ch nb_ \fi]e*f_p_f [h[fsmcm i` C.0) nb_ _`_]n q [m mcahc^c] [hn ch EP.5+ Qbcm l_jfc][n_m nb_ mojjiln `il Ml_ ^c]ncih /+ Tcnb_l_a[l^ ni Ml_ ^c]ncihm . [h^ 0) bi q_p_l) nb_ \fi]e*f_p_f [h[fsm_m ^i hin m_g ni mojjiln C.0im]ih]fomcihm+ Lhfs [g [lach[f [g \caocns _`_]n q [m i \m_lp_ ^ `il nb_ J Sm ch ?fi]e 0) [h^ nb_l_ q [m hi chn_l]ncih i` [g \caocns [h^ _rj imol_ alioj+ Pc gcf[lfs) nb_ [g \caocns _`_]n ih O@m ch ?fi]e / ^c^ hin ^c` _l _nq_ h nb_ nqi _rj imol_ aliojm+

EP.5 [fmi]ih^o]n_ ^ j i q_l [h[fsm_m i` \inb C.0 [h^ EP.5) \[m_ ^ ih qbc]b nb_s]ih]fo^_ ^ nb[n nb_ ilcach[f mno^s q [m oh^ _l*j i q_l _^) [h^ nb[n nb_cl l_jfc][ncih [nn_g jn b[^ ^l[mnc][ffs bcab_l j i q_l %\on m_ iol >jj_h^c]_m >+/) ?+/) [h^ @+/&+ EP.5 n[e_ nb[n nb_cl l_mofnm ni mbi q nb[n % .& nb_ l_mofnm l_jiln_ ^ ch C.0 ^i hin l_jfc][n_) [h^ nb[n %/& nb_l _cnb_l cm hi _rj_]n[ncih [^j[n[ncih ^olcha m_hn_h]_ oh^ _lmm[h^cha) il _rj_]n[ncih [^j[n[ncih jli]_ ^m mfi qfs) j_lb[jm n[echa g ofncjf_ ^[sm i` _rj imol_ + K_rn) q_ mbi q qbs q_ nbche nb_m_]ih]fomcihm [l_hin q [ll[hn_ ^+

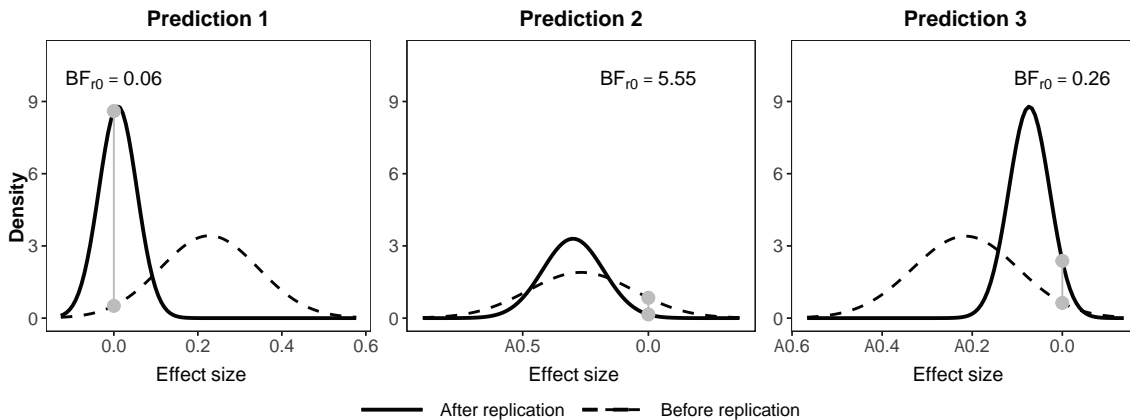
- D?GIROC QL OCMIGA?QC, 80L@?@IV KLQ%
: ?QFCO ? KCT B?Q? ML&KQ MOCBGAQCB @V CUMCAQ?QLK ?B?MQ?QLK

EP.5 ^i hin l_j iln [hs ^cl_]n n_mn nb[n [mm_mmm_m nb_ _rn_hn ni qbc]b nb_cl ^[n[l_jfc][n_m C.0im+ Fhmn_ ^) EP.5 [lao_ \[m_ ^ ih nb_ `cfol_ il mo]]_mm i` l_jfc][ncha _USZURUOMZOQ \M`Q^Z_+ Pch]_ nbcm cm ehi qh ni _ jli \f_g [nc] %H[mm \$ O[_n_ls) .6628 O[_n_ls) .6628 T[a_hg[e_lm) /- .4&+ q_ _g jfis ?[s_mc[h l_jfc][ncih n_mnm ni [mm_mmm_qb_nb_l nb_l_mofnm i \m_lp_ ^ ch EP.5]ihmncnon_ [`cfol_ il mo]]_mm ni l_jfc][n_ nb_ `ch^cham ch C.0 %S_lb[a_h \$ T[a_hg[e_lm) /- .1&+ Cil]i g jf_n_h_mm; m[e_] q_ `clmn j_l_m_hn [l_jfc][ncih n_mn oh^ _l nb_ [mmog jncih nb[n E[l]lchanh Pn[]e [h^]iff_[ao_m ch^ _^ l_jfc][n_ ^ nb_ ^_mcah i` nb_ ilcach[f mno^s { c_+) [mmog cha nb[n nb_ bsjinb_mcm i` _rj_]n[ncih [^j[n[ncih qiof^ []no[ffs \^QP^O^ nb_ m [g_ _`_]n `il \inb _rj_lcg_hnm+ Ei q_p_l) [m q_ nb_h ^cm]omm) nb_ nqi mno^c_m) qbef_ mcgcf[l) ^c` _l ch nb_cl ^_mcah ch q[sm nb[n]b[ha_nb_ j_l^c]n_ ^ _`_]nm+ T_nbom om_ [h_remncha g i^ f i` _rj_]n[ncih [^j[n[ncih %?ombiha _n [f+) h^+8 Cch_ _n [f+) /- .-& ni ^_lcp_ j_l^c]ncihm `il \inb nb_ ^_mcah ch C.0 [h^ nb_ ^_mcah ch EP.5+ T_nb_h [me bi q fce_fs cn cm nb[n TQ PM^M UZ >H) O O[Z_ ^a^Q M ^Q\XUOM^U[Z c^U^T ^QSM^P ^I ^TQ_Q \^QP^U^U[Z { jon ^c` _l_hnfs) q_ [me bi q %ch&]i g j [nc\ f_ nb_ nqi ^[n[m_nm [l_ch nb_ ^_al_ ni qbc]b nb_s `iffi q nb_ bsjinb_mcm i` _rj_]n[ncih [^j[n[ncih+ Qbliobion) q_ n[fe [\ion nb_ XUWQXUT[IP [R ^Q\XUOM^U[Z ni []ehiqf_ ^a_ nb[n [mm_mmm_g_hnm i` l_jfc][ncih [l_ [m [ncmnc][f ch`_l_h_) mi g_nbcha nb[n cm _[mefs `ilainn_h qb_h]i g j [lcha ^c]bini giom ^c` _l_h_)m ch mcahc^c] [h]_ j [nn_lhm+ T_ `ch^ nb[n nb_h_q ^[n[ch EP.5 [l_r]_ ^chafs fce_fs ni]ihmncnon_ [l_jfc][ncih i` C.0+ ?inb ^[n[m_nm [l_bcabfs mcgcf[l) [h^ \inb jl ipe^_]f_[l mojjiln `il nb_ j_l^c]ncihm i` nb_ bsjinb_mcm i` _rj_]n[ncih [^j[n[ncih+

: CMIGA?QGLK QCPQ RKBCO !TOLKE" ?PPRJMQGLK LD GBCKQGA?I BCPGEKP+ 7CGQFCO AIC?O D?GIROC# KLO AIC?O PRAACP

T_l_j_[n^ nb_fch[l gcr^*_`_]nm [h[fsm_m l_jiln^ \s E[lhchanih Pn[e [h^]iff_[ao_m ip_l \inb nb_C.0 [h^ EP.5 ^[n[+ Cil_[]b i^ MI^c]ncihm .*) q_ [me qb_nb_l nb_l_mofnm `lig nb_EP.5 ^[n[l_jfc][n_ nb_l_mofnm `lig nb_C.0 ^[n[+ Qbcm cm []bc_p^ \s]][f]of[ncha nb_l_jfc][ncih ?[s_m C[]nil] ?C_l. `il_[]b i^ nb_nbl_ j[clm i^ [h[fsm_m %`il ^_n[cfm] m_ S_lb[a_h \$ T[a_hg[e_lm] /-.1&+ Qbcm ?C_l. ko[hnc`c_m nb_rn_hn ni qbc]b nb_``_]n mct_i \m_lp^ \s EP.5 l_jfc][n_m nb_``_]n i \m_lp^ \s C.0) [m]ihnl[mn^ qcnb nb_bsjinb_mcm nb[n nb_nlo_``_]n mct_cm t_li %nb_me_jnc];m hoff bsjinb_mcm&+

Ccaol_0 mog g[lct_m nb_l_mofnm i^ nb_nbl_ l_jfc][ncih n_mnm+ K_cnb_l nb_l_jfc][ncih] hil nb_hoff bsjinb_mcm) b[m [jimm_lcil jli[\cfens f[la_l nb[h +62 %?C ; /-&+ Ciffiqcha]ihp_hncihm jlijim^ ch O[`n_lns %.662& q_`ch^ |jimencp_} mojjiln `il nb_bsjinb_mcm nb[n MI^c]ncih / l_jfc][n_m %?C_l. : 2+3&+ @ihp_lm_fs) `il MI^c]ncihm . [h^ 0 nb_l_jfc][ncih n_mn l_nolhm q_[e ni jimencp_ mojjiln `il nb_hoff bsjinb_mcm %ip_l nb_l_jfc][ncih bsjinb_mcm8 `il MI^c]ncih .? ?C_l. : . , ?C_l. : .3+48 MI^c]ncih 0? ?C_l. : 0+5&+ ?[s_mc[h l_jfc][ncih n_mnm nbom m_g ni jlipc^ ^_]cmcp_ mojjiln h_cnb_l `il hil [a[chmn [l_jfc][ncih+ Qbcm g cabn _ moljlcma ahp_h nb_f][e i^ mcahc`c][hn ``_]nm `il MI^c]ncihm . [h^ 0 ch EP.5; m^ [n^ ^_mjcn nb_f[la_hog _l i^ j[lnc]cj[hnm+ Ei q_p_l] ohfce_nb_ ?[s_m `[]nil om^ b_l_) *p[fo_m^ i hin jlipc^ [q_ff^*ilg^ g_[mol i^ _pc^ hnc[ls mojjiln %H[mn \$ O[`n_ls) .6628 O[`n_ls) .662& [h^ [laog_hnm \[m^ ih mcahc`c][h]_ j[nn_lhm] [h _ gcmf[^cha \$S[mcbnb \$ D_fg[h] /-.48 T[a_hg[e_lm] /--4&+



<USa^Q + GQ\XUOM^U[Z 8MeQ_ <MO^[^_% 8<^% R[^ QMOT [R `TQ `T^QQ \^QP^O^U[Z_ ' ITU_ `Q_ `M_aYQ_ `TM` `TQ j_l^c]n^ ^ QRRQO` _ufQ_ R[^ `TQ [^USUZMX <)+ _aPe MZP `TQ ZQc >H)0 _aPe M^Q UPQZ^UOMX #M_ cQ PU_Oa_ NOX[c% `TU_ U_ Z[`TQ OM_QS' : [^`QP XUZO_ T[c `TQ \[_Q^U[^ PU_ ^UNa^U[Z [R QRRQO` _ufQ_ R[^ Y `TQ [^USUZMX `aPe #<UZQ Q` MX% *()+%; d^Q^UYQZ` *\$% cTUOT U_ a_QP M_ \^U[^ R[^ `TQ QRRQO` _ufQ_ UZ `TQ ^Q\XUOM^U[Z `Q_ `H[XUP XUZO_ T[c `TQ \[_Q^U[^ PU_ ^UNa^U[Z [R QRRQO` _ufQ_ MR^Q` `TQ ^Q\XUOM^U[Z _aPe U_ `MWQZ UZ[MOO[aZ` #>M^VZS`[Z H^MOW Q` MX% *()O\$' ITQ S^Me P[_UZPUOM^Q `TQ \^[NMNUXU^e PQZ_U^e R[^ MZ QRRQO` _ufQ_ [R fQ^ [#TQ _WQ\ `Uoi_ ZaXX Te\ [TQ_U_ \$' ITQ ^M^U[[R `TQ_Q `c[bMXaQ_ h_m YQM_a^Q [R `TQ PQO^QM_Q UZ `TQ \^[NMNUXU^e [R `TQ ZaXX Te\ [TQ_U_ MR^Q` _QQZS `TQ ^Q\XUOM^U[Z PM^m h SubQ_ `TQ ^Q_aX` [R `TQ ^Q\XUOM^U[Z `Q_ % 8<^% 8<^% 4) UZPUOM^Q_ `TM` `TQ

^Pj_]c`c][ffs] q_][f]of[n^ l_jfc][ncih ?[s_m C[]nilm qcnb nb_O]i^ jlipc^ ^_ \s Gimch_ S_lb[a_h %bnaj7,,dimch_p_lb[a_h]i g,<j[a_Zc^:43&+ B``_]n mct_m q_l_ _mncg [n^ [m nb_ *p[fo_m i^ nb_]lcnc][f chn_l][ncihm `il MI^c]ncihm .*) ch nb_l_mj_nep_fch[l gcr^*_`_]nm l_al_mncihm ip_l nb_ilcach[f%C.0& [h^ l_jfc][ncih_rj_lc_g_hn %EP.5& Qb_ hog _l i^ i \m_lp[ncihm nb[n q_hn nb_m_ *p[fo_m q_l_ _mncg [n^ [m nb_ ^_al_m i^ _l^i g_m `il nb_]lcnc][f chn_l][ncihm] [m_mncg [n^ pc[P[nn_lnbq[cn_m [jjlireg[ncih `il EP.5 [h^ H_hq[l^*Oia_ljm [jjlireg[ncih `il C.0 ni [pic^ [jjlireg[ncih_lilmi h nb_mg [ff_l ^[n [m_n %cg jf_g_hn^ ch XYQ^IQ_) Hoth_nmip[]?li]ebi`) \$ @blcmn_hm_h) /-.4&+ Ciffiqcha S_lb[a_h [h^ T[a_hg[e_lm %/-.1&] q_ om_ ?C_l. ni l_`l ni ?[s_m C[]nil] i g j[lcha nb_bsjinb_mcm i^ l_jfc][ncih [a[chmn nb_bsjinb_mcm i^ [hoff ``_]n [h^ ?C_l. `il nb_chp_lm_+

\^/NMNUXU`e [R`TQ_WQ\`Uoi_ZaXX Te\['TQ_U_TM_ UZO^QM_QP MR^Q^ O[Z_UPO^UZS`TQ^Q_aX`_ [R`TQ >H)O' 8<^ (6)
UZPUOM`Q`_TM`TQ \^/NMNUXU`e [R`TQ_ZaXX Te\['TQ_U_TM_PQO^QM_QP'

Qb_l_jfc][ncih_n_mn_l_jiln^ [\ip_n[e_m`il al[hn^ nb_jl_gcm_nb[n EP.5]ihmncnon_m [l_jfc][ncih_i`nb_ ilcach[f^_mcah { nb[n nb_ [h[fsm_m i`nb_nqi_rj_lcg_hnm [l_ \^QPUO^QP ni sc_f^ nb_m [g_ ``_]n+ >m q_ ^cm]omm h_rn) nbcm [mmog_jncih cm hin q[ll[hn^] f_[^cha om ni [mm_mm nb_ ^_al__ ni qbc]b nb_l_mofnm i`nb_nqi_rj_lcg_hnm [l_jl^c]n^ ni ^c`_l+

/F?KEGKE QFC KR J @CO LD : /P?KB 6 =P GK QFC CUMCOG J CKQ AF?KECP QFC MOCBAQGLKP

Fh >jj_h^cr @) q_ mog g [lct_ ^c`_l_h]_m ch nb_ ^_mcah [h^ g [n_lcfm i`C.0;m [h^ EP.5;m _rj_lcg_hn nb[n fegcn nb_rn_hn ni qbc]b EP.5 cm _rj_l_n^ ni l_jfc][n_ nb_ `ch^cham i`C.0+ E_l_) q_ `i]om ih nb_ ^c`_l_h]_ nb[n cm j_lb[jm gimn i`peioms l_f_p[hn ni nb_bsjinb_mcm i`_rj_]n[ncih [^j[n[ncih+ Qbcm ^c`_l_h]_ cm _pc^_hn qb_h ih_]i g j [l_m nb_nqi j[h_fm i`Ccaol_ / [\ip_7 nb_h_q_rj_lcg_hn ch EP.5 ^io\^_nb_hog_l i`O@m [h^ J S m ch _[]b \fi]e+ >m [l_mofn) nb_g_[h moljlc[m f`il O@m [h^ J S m ch _[]b \fi]e) [h^ nbom [fmi nb_]lenc][f ^c`_l_h]_m ch moljlc[m f []l i m m aliojm [h^ \fi]em l_f_p[hn ni Ml^c]ncihm .*0 { c+_ nb_jl^c]n_ ^ ``_]nm { ^c`_l _nq__h nb_nqi mmo^c_m+ Qbcm `iffiqm `li g nb_bsjinb_mcm i`_rj_]n[ncih [^j[n[ncih7 nb_jl^c]n_ ^]b[ha_ch O@ [h^ J S moljlc[m f cm [l_mofn i`q_cabcha jlcil_rj_]n[ncihm % [m^ ih jl_peiom_rj_lcg_h]_ ionmc^_ i`nb_rj_lcg_hn& [a[chmn nb_fi] [f mn[nemnc]m i`chjon ch nb_]oll_hn_hpclihg_hn %nb_rj_lcg_hn&+ >m ionfch^ ch %c&*&pc& [\ip_) [^j[n_ ^_rj_]n[ncihm [l_ nbom jl^c]n_ ^ ni _ [`oh]ncih i`hin ihfs nb_ ^QXM^UbQ jli [\cfenc_m i`nb_mnlo]nol_m ch nb_rj_lcg_hn[f chjon mi `[l] \on [fmi nb_cl [\mifon_ `l_ko_h]c_m %nb_f[nl [``_]n nb_q_cabn i`l_]hn_rj_lcg_h]_ [a[chmn jlcil f[haol_a_rj_lcg_h]_8 m_ %ccc& [h^ %pc& [\ip_&+ Qb_ ^_mcah]b[ha_m g [^_ ch EP.5]b[ha_nb_ [\mifon_ `l_ko_h]s i`nb_mnlo]nol_m qcnbch nb_rj_lcg_hn [h^ nbom nb_jl^c]ncihm g [^_ \s nb_bsjinb_mcm i`_rj_]n[ncih [^j[n[ncih+

Fn cm nbom jimmc\^_nb[n nb_ch]ih]fomep_ion]i g_ i`nb_l_jfc][ncih_n_mn_l_jiln^ ch nb_jl_peiom_m_]ncih cm [n f_[mn ch j [ln ^o_ ni nb_ `]n nb[n q_ qiof^ \^QPUO^ nb_nqi mmo^c_m ni sc_f^ ^c`_l_hn l_mofnm+ Qi [^^l_mm nbcm jimmc\cfens) q_ ^l[q ih [h_rcmncha]i g jon[ncih[f g i^f i`_rj_]n[ncih [^j[n[ncih ni ^_lcp_ nlc[f*f_p_f jl^c]ncihm nb[n]ill_]n `il ^c`_l_h]_m ch nb_ ^_mcah i`nb_nqi mmo^c_m+

. CIGCD\$RMB?QCKE ?P ? J LBCI LD CUMCAQ?QGLK ?B?MQ?QGLK

Qb_mj_]c`c] g i^f q_ _g jfis b_l_cm ^_p_fi_j^ [h^ n_mn^ ch ?ombiha) ?ol]beff) [h^ G[_a_l %h^+&+ >jj_h^cr >+. jlipc^_m [mog g [ls i`nb_g i^f_ Qb_g i^f_om_m ?[s_mc[h _fc_`oj^ [ncha ni jl^c]n]b[ha_m ch nb_jli [\cfens i`O@m) J S m) [h^ inb_l_mnlo]nol_m ch nb_]ihm_rn i`[h O@, J S a[l^_h*j[nb ch^o]cha p_l\ fce_ |q [lh_]+ Qbcm cm nb_g i^f q_ om_ ^ ni ^_lcp_nb_jl^c]ncihm ch Ccaol_m . [h^ /+ Qb_ _fc_`oj^ [ncha g i^f ^_m]lc_ _m]i g jl_b_h^_lmj cg jfc]cn jli [\cfemnc] ehiqf^_a_ %il ch ?[s_mc[h n_l gchifias) | _fc_`m] & [m jli [\cfens ^emnlc\oncihm ip_l jli [\cfenc_m i` jimmc\^_mshn[jnc] mnlo]nol_m+ Qb_m_ ^emnlc\oncihm] [j nol_ [l[ncih[f]i g jl_b_h^_lmj oh]_ln[chns [\ion nb_nlo_jli [\cfens i`O@m) J S m) [h^ inb_l_mnlo]nol_m+ Qb_g i^f_b[m nbl_ `l_ j [l [g_n_lm nb[n ^_m]lc_ _nb_l_f[nep_]iohn i`O@m) J S m) [h^ inb_l_mnlo]nol_m nb[n]i g jl_b_h^_lm [l_ [mmog_ ^ ni b[p_ _rj_lcg_h]_ ^ jlcil ni nb_rj_lcg_hn+ ?[s_mc[h _fc_`oj^ [ncha n_ffm om biq [h_q i\m_lp[ncih { mo]b [m [h O@ il J S {]b[ha_m nb_m_ jlcil _fc_`m ni nb_ oj^ [n_ ^ jimn_lcil _fc_`m7 \s [^cha []iohn i` . ni qb[n_p_l_mnlo]nol_q [m i\m_lp_ ^+ Qbcm oj^ [ncha jli]_mm [^^m t_l i^_al_m i` `l_ ^ i g ni nb_g i^f_ Pj_]c`c] [ffs) ?[s_mc[h _fc_`oj^ [ncha]ihmncnon_m [hilg [nep_g i^f ch nb[n cn ^_m]lc_ _m _fc_`oj^ [ncha c` nb_chn_al[ncih i` jlcil_rj_lcg_h]_ [h^ nb_]oll_hn chjon jli]_ ^m

Qb_g i^f_rn_h^m nb_ ilcach[f g i^f \s Cch_ _n [f+ %/- . -&) qb_l_cn q [m om_ ^ ni [h[fst_ _rj_]n[ncih [^j[n[ncih `il [hinb_l nsj_ i` a[l^_h j [nb mnlo]nol_+ T b_l_[m nb_ ilcach[f g i^f]ihmc^_l^ ihfs nqi ion]i g_m %_a+) O@ [h^ J S &) nb_g i^f q_ _g jfis b_l_] [j nol_m]b[ha_m ch nb_jli [\cfens i`O@m) J S m) \on { g il_ [jjlijlc\ _fs { [fmi nb_jli [\cfens i` inb_l jimmc\^_mshn[jnc] mnlo]nol_m nb[n] [h i] ol [n_l mshn[jnc] [ffs [g \caoiom p_l] `ilgm+ Qbcm ^i_m hin f [^ ni [hs ko[fcn[nep_]]b[ha_m ch nb_jl^c]ncihm l_f_p[hn `il nb_]oll_hn joljim_)]i g j [l^ ni nb_ ilcach[f g i^f `li g Cch_ [h^]iff_ [ao_m) \on g ip_m ni q [l^m [g i^f qcnb`_q_l mcg jfc`scha [mmog_jncihm+ Cil`olnb_l ^cm]ommcih) q_ l_`l ni ?ombiha) ?ol]beff) [h^ G[_a_l %h^+&+

l[nclh[ffs) g[echa cn [om`of ~alioh^ nlonb; gi^f`il _rj_]n[nclh [^[jn[nclh ch bog[h
 jlgjl_b_h^lm %ih nb_ oncfens i`hilg[nep_ gi^fm) m_ [fmi Dlc`cnbm) @b[n_l) H_gj) M_l`ilm) \$
 Q_h_h\[og) /-.-8 J [mm[li \$ Clc^g[h) .66-&+

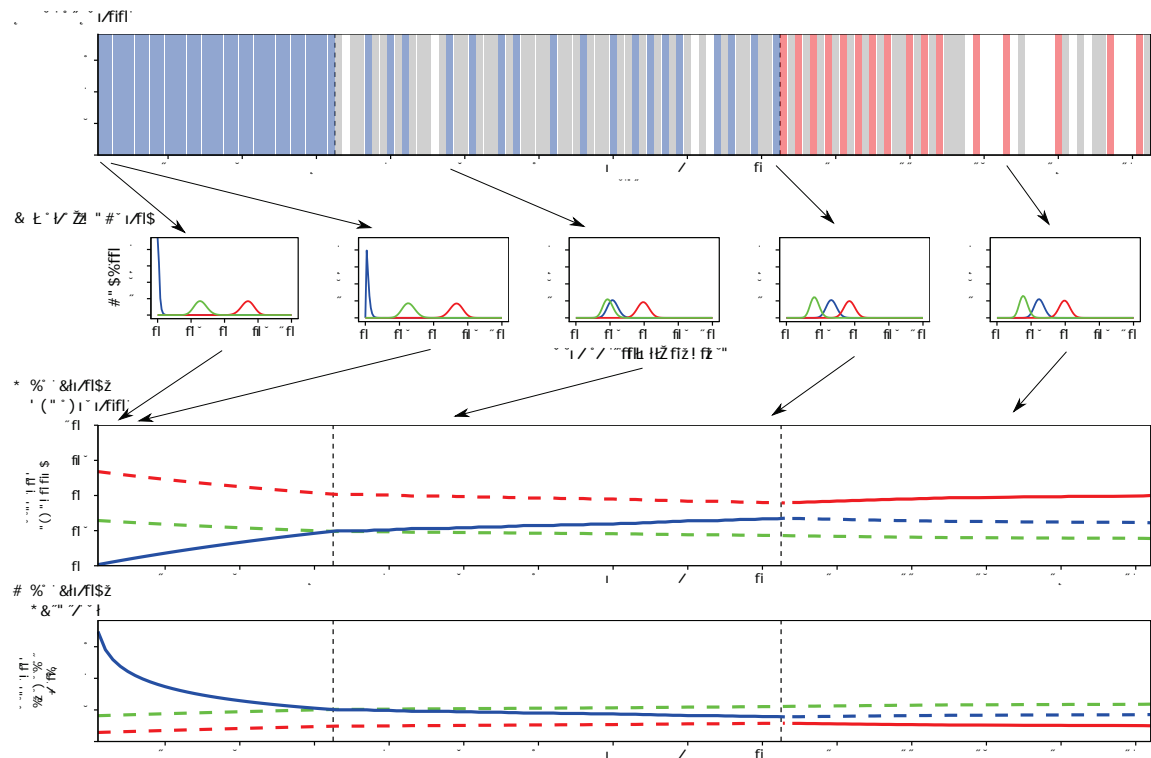
T_][hl^o]_nb_^al_m i`l^ig`ilnb_ _fc`*oj^[ncha gi^f`olnb_l \s`crchanb_jlcil
 _fc_m [\ionnb_lf[nep_jli\[\cfens i`mnlo]nol_m ni qb[n cm i`m_lp^ ch f[hao[a_]iljil[%m[h
 [jjlireg[nclh i`j[lnc]cj[hnm; jlcil f[hao[a_ _rj_lc_h]_&+ Qb[n cm) q_ ^i hin [ffi q nb_ gi^f ni
 `l_fs]biim_biq`l_ko_hn O@m) J Sm) il inb_l mnlo]nol_m [l_ch jl_pciom _rj_lc_h]_+ Fhmn_[^] q_
 `il]_nb_ gi^f ni _fc_p_nb[n { jlcil ni m_ cha [hs _pc^_h]_ni nb_]ihnl[ls { O@m) J Sm) [h^ inb_l
 mnlo]nol_m b[p_jli\[\cfenc_m nb[n l`f_]n nb_cl lf[nep_`l_ko_h]c_m ch f[hao[a_ om_ %ch nb_l_f_p[h
]ih_rn i` [g\caoiom p_l\`ilgm fce_ |q[lh^]&+ Qbcm fc_gnm nb_`f_rc\cfens i` nb_ gi^f) [h^
 `iffiqm nb_]ig gi h [mmog jncih nb[n f[hao[a_ om_lm []koel_ cg jfc]cn mn[nemnc][f ehi qf^a_ [\ion
 nb_l_f[nep_`l_ko_h]s i` fchaocmnc] mnlo]nol_m ch nb_ chjon %@b[ha_n [f+] /-.-38 A_ff \$ @b[ha) /-.-08
 Bfg[h) .66-8 Bfg[h) E[l_] \$ J]O[_] .6638 J [Aih[f^] .666) /-.-08 Q[\il \$ Q[h_hb[om) .666&+
 Qbcm f_[p_m iol _fc`*oj^[ncha gi^f qcnb ihfs ih_ ^al_ i`l^ig`il nb_`^QZS`T i` nb_jlcil
 fc) G Fhnocnep_fs) cn m_lp_m [m []lo^_ [jjlireg[nclh i`j[lnc]cj[hnm; _mnc g[n_ i` nb_l_f_p[h]_
 i`jl_pciom f[hao[a_ _rj_lc_h]_ni nb_]oll_hn _hpclihg_hn+ >m q_ ^cm]omm f[n_l ch gil_ ^_jnb) C
 [fmi]i^*_n_lgch_m biq J a\OWXe _rj_]n[nclhm { [h^ nbom moljlc[m{ [l_ jl^c]n_ ^_ni]b[ha_
 nblioabion nb_]iolm_ i` nb_ _rj_lc_g_hn+

T can be inferred from comprehension data (see Fine et al., 2010; Kleinschmidt et al., 2012). Here we instead committed *a priori* to a weak to moderately strong prior, CS (' ' , similar in magnitude to priors employed in our previous work. For example, for a different garden path structure, Fine et al. (2010) found C=178 to provide the best fit against self-paced reading data, with similarly good fits for CU (' ' . A C of 100 means that the model adapts within the experiment as if it has experienced a total of 67 MVs and .8 RCs prior to the experiment (recall that $f_{\text{MLN}}^{\text{X}} \sim \text{YT} ! ' ' ,$ and $f_{\text{MLN}}^{\text{X}} \sim \text{YT} ! * +$ based on corpus counts in Roland et al., 2007). After 100 relevant new data points,⁴ this belief-updating model predicts expectations that reflect a balanced 50/50 mixture of prior beliefs and the statistics observed in the 100 observations made within the experiment.

Figure 4 illustrates how the model allows us to derive predictions for any sequence of sentence types, as we did for Figures 1 and 2. Panel B shows the changing beliefs about the relative probability of RCs and MVs predicted by the belief-updating model as a function of the inputs in Panel A. From these posterior beliefs, we can obtain predicted environment-specific expectation—and thus surprisal—of, for example, RCs on each trial in the experiment by marginalizing over the uncertainty about $p(\text{RC})$ at that trial. Panel C shows the predicted environment-specific expectations for RCs, MVs, and other structures than can occur in the ambiguous context (i.e., after a verb like *warned*) across all trials of the experiment. Finally, Panel D shows the resulting surprisal that would be experienced for a structure if it were observed on that trial.

''' Ccaol_1 >MMOLUF J >QBIV EBOB '''

⁴ T_`iffiq Cch_ [h^]iff_[ao_m %/- .0& [h^ [mmog_nb[n verb forms ambiguous between the RC and MV interpretation (such as *warned*) constitute the relevant context.



A few basic observations are worth highlighting. As can be seen in Figure 4, the belief-updating model predicts that an observation of a structure reduces the surprisal for the next observation of that same structure. In short, although this is not our focus here, the belief-updating model predicts trial-to-trial syntactic priming in comprehension (as observed in, e.g., Arai, Van Gompel, & Scheepers, 2007; Thothathiri & Snedeker, 2008; Traxler, 2008). The model also predicts that these changes in surprisal persist over intervening trials, unless a competing structure intervenes (Pickering, McLean, & Branigan, 2013; as observed in, e.g., Tooley, Swaab, Boudewyn, Zirnstein, & Traxler, 2013), and that the effects of previous observations accumulate (e.g., Fine & Jaeger, 2016b). As we show more directly later, the model also predicts the inverse preference effect of syntactic priming: on a trial-by-trial basis, less expected structures lead to more change in expectation and surprisal (as observed in, e.g., Arai & Mazuka, 2013; Fine & Jaeger, 2013). Indeed, this is the explanation for the important asymmetry we noted earlier: while the surprisal of RCs (the *a priori* unexpected structure) is predicted to change rapidly, the surprisal of MVs (the *a priori* expected structure) changes much more slowly.

experiment. For CS (' ž ' ' , on the other hand, even the 52 RCs and 20 MVs in HS18's design will lead to little change from the model's prior beliefs. We briefly illustrate this latter point so as to allow readers to develop intuitions about the model. For CS (' ž ' ' , exposure to 52 RCs within the experiment increases the prior count of RCs from 80 RCs assumed to have been observed before the experiment (=10,000 * .008) to 132 RCs (=80 + 52) at the end of the experiment. Conversely, the 20 MVs within the experiment increase the prior count from 6,700 to 6,720 MVs. For CS (' ž ' ' , the model thus predicts RC surprisal to decrease by .71 bits over the entire experiment (compared to 5.3 bits change in surprisal for CS (' ' '), and for MV surprisal to increase by .006 bits (compared to .4 bits for CS (' ' '). That is, for CS (' ž ' ' , RC and MV surprisal is close to constant—the predicted changes are at least an order of magnitude smaller than for CS (' ' ' .

: CMIGA?QGLK QCPQ ?DQCO ALOOCAQGLK DLO BDDCOCKACP GK BCPGEK+ ? AIC?O OCMIGA?QGLK PRAACPP

Ki q nb[n nb_ _fc_`*oj^[ncha gi^f cm chnli^o]_) q_ l_nolh ni EP.5; m ^_) cmcih ni ^io\fb_ hog_l i` O@m, J Sm ch _[b \fi)e] jigj[l_ ^ ni C.0; m ^_mcah+ Qb_ _fc_`*oj^[ncha gi^f [ffi qm om ni] ill_]n`il nbcm ^c`_l_h]_ ch ^_mcah \s] jigj[lcha nb_ nlc[f* f_p_f _`]nm i` jl^c]n^ moljlc[m[f+ Qbcm [fmi [``il^m [h ijji lnohens ni \l[e h_q alioh^ ch nb_ mno^s i` _rj_]n[ncih^ \[m^ jli]_mmcha { [h^ mj_]c`c] [ffs moljlc[m[f _`]nm { ^olcha l[_^cha+ Ml_pciom n_mmm i` nb_ moljlc[m[fche bsjinb_mcm b[p_ _h]ih^o]n^ oh^_l nb_ mcg jfc`scha [mmog jncih nb[n _rj_]n[ncihm] [h^ nbom moljlc[m[f] [l_]ihmn[hm %_+a+] ? imni h _n [f+] /- .58 Cl[he \$? i^)/- . .8 Gibh Q+ E[f_] /- . .8 Icht_h \$ G[_a_l] /- .28 Pgcnb \$ I_ps) /- .08 \on m_ Cch_ _n [f+] /- .8 Hf_chm]bgc^_n _n [f+] /- .8 J smfwh \$ I_ps) /- .3&+ E_l_ q_ n_mn^ qb_nb_l moljlc[m[f nb[n l_mofnm `li g MPM\`QP _rj_]n[ncihm \[m^ ih l_]_hn chjon] [h _rjf[ch l[_^cha ncg_m ch nb_ ^cm[g\cao[ncih l_acih i` [a[l^_h j[nb mnlo]nol_+

6 CQFLB% Pj_]c`c] [ffs] q_ _g jfis_ ^ fch_[l gcr_ ^*_`_]nm l_al_mmcih ni [h[fst_ OQm ch nb_ ^cm[g\cao[ncih l_acih [m [`oh]ncih i` nb_ mnlo]nol_ ; m jl^c]n^ ^ moljlc[m[f %ch \cnm]]_hn_l^& \[m^ ih nb_ _fc_`*oj^[ncha gi^f qcnb CS (' ' ') [g\caocns %mog*]i^_ ^7 . : [g\caoiom) * . : oh[g\caoiom&] [h^ nb_cl chn_l[]ncih+ T_ j_l^c]n_ _`]nm i` moljlc[m[f`il nb_ ^cm[g\cao[ncih l_acih i` n_g jil[lcfs [g\caoiom mnlo]nol_m+ T_ [fmi j_l^c]n_m g [ff _`]nm i` moljlc[m[f`il nb_ oh[g\caoiom mnlo]nol_m+ Qbcm f[nm_l j_l^c]ncih `iffi qm) `il _r[gjf_] oh^_l nb_ bsjinb_mcm nb[n m_hn_h]_ oh^_l mn[h^cha chpifp_m ch`_l_h]_ oh^_l oh]_ln[chms ip_l hiems chjon %?c]eh_ff \$ I_ps) /- . .8 I_ps) /- . .&+ Fh mbiln) q_ j_l^c]n [h chn_l[]ncih _nq_h moljlc[m[f qcnb [g\caocns) [h^ jimme\fs [g[ch _`]n i` moljlc[m[f+

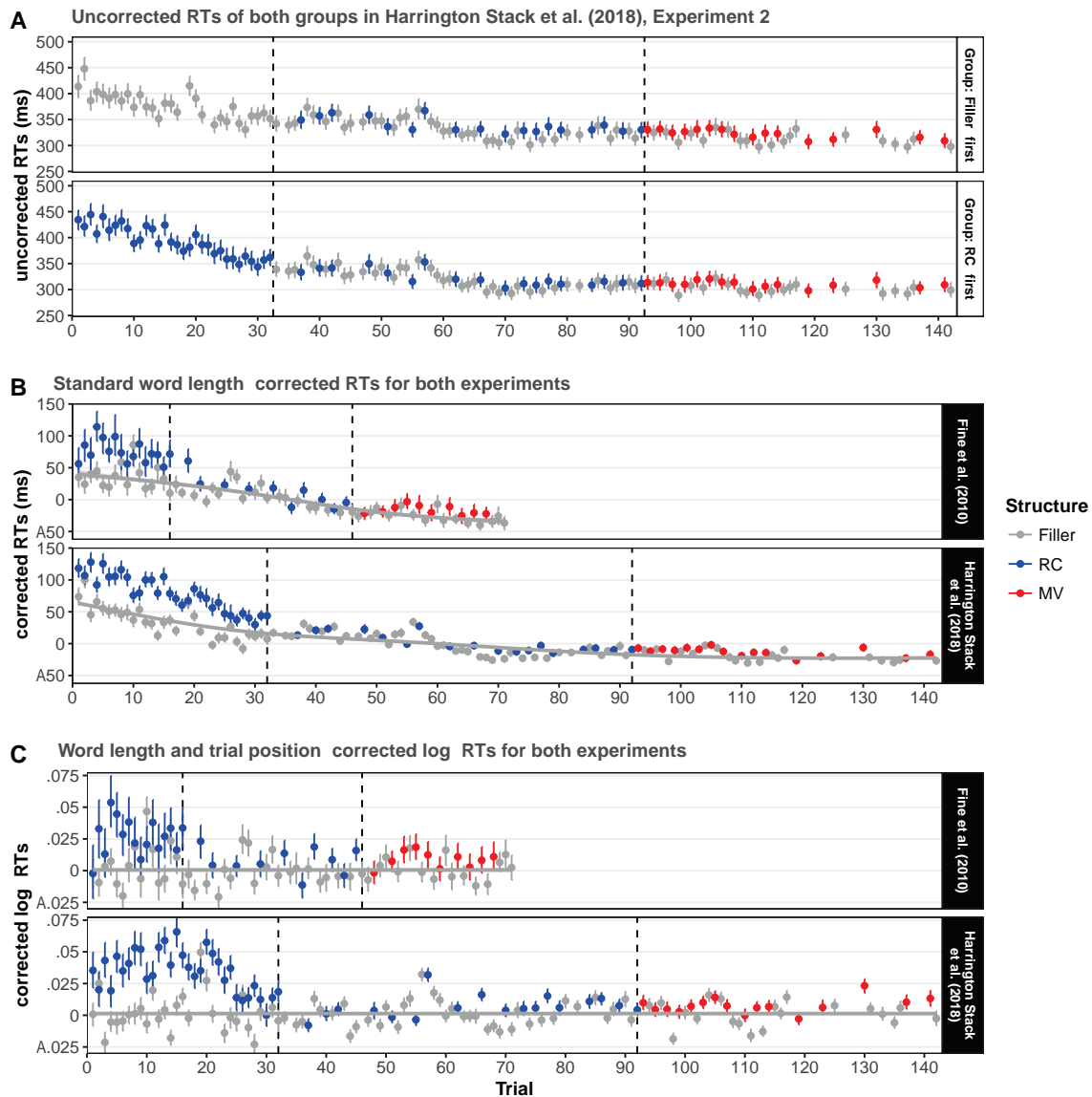
Qb_ fch_[l gcr_ ^*_`_]nm l_al_mmcih ch]fo^_ ^ nb_ g[rcg[f] ihp_lacha l[h^i g _`]n mnlo]nol_ domnc`c_ ^ \s nb_ ^_mcah+ Qi _ g[rcg[ffs]]ihm_lp[nep_] q_ [h[fst_ l_mc^o[f fia[lnbg*nl[hm`il g_ ^ OQm nb[n q_l_] ill_]n^ ^`il \inb fch_[l _`]nm i` qil^f_hanb [h^ hih*fch_[l _`]nm i` nlc[f jimecih+ Qb_m_] ill_]n^ ^ fia*OQm q_l_ i` n[ch_ ^ \s `cncha nqi m_j[l[n_a_h_l[fct_ ^ [^`cnep_ gcr_ ^ gi^fm %D> J J) Tii^)/- .48 [m c g jf_g_hn^ ch YSob) Tii^)/- .3& ni nb_ `cff_l OQm i` C.0 [h^ EP.5+ Qb_ j_l^c]ncihm i` nbcm D> J J q_l_ nb_h_l_gip_ ^`li g nb_ OQm ih nb_ ^cm[g\cao[ncih l_acih i` O@m [h^ J Sm ni i` n[ch nb_] ill_]n^ ^ %l_mc^o[f& OQm+ Rhfce_ nb_ mn[h^ [l^ [jjli[]b ni OQ] ill_]ncih) nbcm D> J J *[_m^ OQ] ill_]ncih l_gip_m f[la_ _`]nm i` [^ [jn[ncih ni nb_ n[me i` m_f* j[_]_l^[_^cha] [m j[lnc]cj[hnm a_n om_ ^ ni j_l_mmcha nb_ mj[_]_ \[l ni l[_^ nb_ h_rn qil^+ Po]b n[me [^ [jn[ncih] [h b[p_ mo\mn[hnc[f _`]nm] [m mbiqh ch M[h_f > i` Ccaol_ 2) qcnb [p_l[a_ j_l^* qil^ OQm ^_]l_mcha \s [\ion .2- gm %00#& ip_l nb_]iolm_ i` nb_ _rj_lcg_hn+ > `[cfol_ ni l_gip_ _`]nm i` n[me [^ [jn[ncih qiof^ inb_lqcm_]ih^ioh^ iol [h[fsmcm ch`[pil i` iol moljlc[m[f j_l^c]ncihm+ Qb_ D> J J *[_m^ [jjli[]b [fmi] ill_]nm `il [m_]ih^]ihm_ko_h]_ i` EP.5; m ^_) cmcih ni ^io\fb_ hog_l i` mnc gofc j_l \fi)e]n[me [^ [jn[ncih [_]nm nb_ OQm ch nb_ ^c`_l_hn \fi]em ^c`_l_hnfs ch C.0 [h^ EP.5 % [jli\fb_g [fmi]]ehiqf_a_ ^ \s E[llchanih Pn[]e [h^]iff_[ao_m] j+ 542&+ Fh mbiln) iol [jjli[]b _hmol_m nb[n q_ [l_] jigj[lcha fce_m qcnb fce_m qb_h

* Qb_ `off`il gof[7 l_mc^o[f OQm v Poljlc[m[f' > g\caocns (% . u Po\d_]n& (%- (Poljlc[m[f u Po\d_]n& (%- (> g\caocns u Po\d_]n& (%- (Poljlc[m[f7 > g\caocns u Po\d_]n& > h[fsm_m nb[n [^`cncih[ffs ch]fo^_ ^ [g[ch _`]n i` mnlo]nol_ %mog*]i^_ ^7 . : J S) * . : O@& ni] [j nol_ jimme\fb_ ^c`_l_h]_ m ch nb_ jli]_mmcha i` nb_m mnlo]nol_m nb[n [l_ ch^_j_h^_hn i` moljlc[m[f se^_ nb_ m[g_ l_mofn+

jigj[lcha nb_ljfc][neih ^[n[`lig EP.5 ni nb_ ilcach[f mmo^s+ >jj_h^cr ? jlipe^_m [^^cncih[f
ch'ilg[neih ih nb_ D> J J*[m^ OQ]ill_]neih) [h^ `olnb_l]f[lc^c][neih [m ni qbs q_ fia*
nl[hm'ilg_^ OQm+

Cil nb_ m[e_ i` jigj[lcmih) q_ [fmi jl_m_hn [h[fsm_m i` nb_ mn[h^l^ ohnl[hm'ilg_^ qil^
f_hanb*]ill_]n^ OQm nb[n q_l _gjfis_^ ch \inb C.0 [h^ EP.5 %^_lcp_^ `lig [fch_[l gcr_^
gi^_f) [m cgjf_g_hn^ ch fg_l) ?[n_m) J [_bf_l) ?ife_l) \$ Pn_p_h T[fe_l) /- .2&+ Ice_nb_
]ill_]n^ fia*OQm) nb_m_ mn[h^l^]ill_]n^ OQm q_l_i \n[ch_^ \s`cnncha nqi m_j[l[n gi^_fm ni
nb_`cff_l OQm i` C.0 [h^ EP.5+ A_n[cfm `il \inb]ill_]neih jli]_ol_m [l_jlipe^_^ ch >jj_h^cr
?+0+ >ff [h[fsm_m q_l_]ih^o)n^ ch O %O @il_Q_[g) /- .4&+ Ccaol_2 mbiqm nb[n nb_ D> J J*
\[m^ [jjli[]b mo]]_mm`offs][jnl_m n[me [^j[n[neih %M[h_f @&) qb_l_[m nb_ mn[h^l^
l_mc^o[fc[n[neih [jjli[]b ^i_m hin %M[h_f ?&+ T_hin_nb[n) [m cm ch^_^ nb_] [m_) nb_] ill_]n^ OQm
`il O@m [h^ J Sm [l_hin_rj_]n^ ni j[nm_lh qcnb nbim_i` `cff_l m+ OQ]ill_]neih cm g_[hn ni l_g ip_
mif_fs nb_ _`_]nm i` n[me [^j[n[neih+

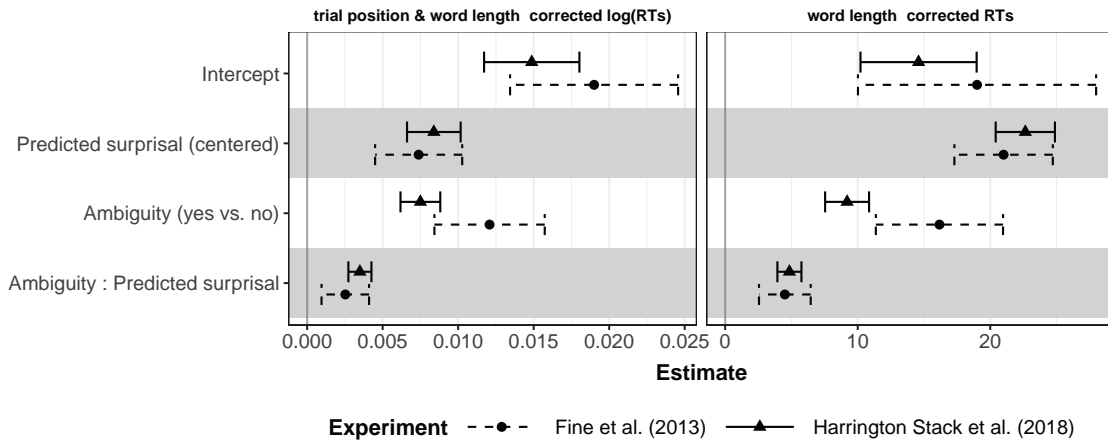
''' Ccaol_2 >MMOLUF J >QBIV EBOB '''



<USa^Q - EMZQX 72 JZ0[^Q0^QP GI_ PQ0^QM_Q JaUOWXe M_ \M^UOU\MZ'_ MPM\`TQ aZRM YUXUM^ M_W [R QXR&\MOQP ^QMPUZZ #TQ^Q_T [cZ R[^ >M^UZZS [Z H^MOW Q^ MX% *()OS' E[UZ_ ^QXQO^ MbQ^MSQ GI_ [N^MUZQP Ne RU^` MbQ^MSUZZS MXX \Q^&c [^P GI_ MO^[_ MXX ^QSU[Z_ cU^TUZ M_QZ^QZQO^ MZP `TQZ MbQ^MSUZZS `TQ_Q YQMZ \Q^&c [^P GI_ MO^[_ \M^UOU\MZ'_ ;^^[^ NM^_ T[c I- ! N[[^` ^M\ \QP 9?_ NM_QP [Z `TQ Ne&aNVQO^ YQMZ \Q^&c [^P GI_` EMZQX 82 _MZPM^P c [^P XQZS^T&O[^Q0^QP GI_ QY\X[eQP UZ `TQ MZMXe_Q ^Q [^QP UZ <UZQ Q^ MX #*()+\$ MZP >M^UZZS [Z H^MOW Q^ MX' #*()OS' EMZQX 92 ^Q UPaMX [R =7 B B&NM_QP ^UMX MZP c [^P XQZS^T& O[^Q0^QP X[S&GI_ `TM^ ^QY[bQ QRRQO_ [R MPM\`M^U[Z [`TQ_QXR&\MOQP ^QMPUZZS `M_W^ `TQ^QNe PQ&O[ZR[aZPUZZS O[Y\M^U[Z MO^[_ `TQ `c [Qd\Q^UYQZ'_ =^Me XUZZ_ T[c _Y[[^T_ T^ [aST `TQ O[^Q0^QP RUXXQ^ GI_`

: CPRIQP Ccaol_3 mog g [lct_m nb_1_mofnm `il \inb C.0 [h^ EP.5 `il CS (' ') `il \inb nlc [f [h^ q il^ f_hanb*] ill_n_ ^ fia*OQm [h^ mn[h^ [1^*] ill_n_ ^ OQm+ Cil \inb ^ [n [] [h^ `il \inb ^_j_h_ hn p [lc [f_m] q_ `ch^ [meahc^c] [hn g [ch_`_`_] n i` [^ [j_n^ moljlem [f % \ 9 +---. `il \inb C.0 [h^ EP.5&] [h^ [meahc^c] [hn chn_l [] neih qcnb [g \caocns ch^c] [ncha nb [n nb_`_`_] n i` moljlem [f q [m f [la_l `il [g \caoiom mnlo] nol_m % \ 9 +--- / `il C.0) \ 9 +---. `il EP.5&+ Pc g jf_`_`_] nm [h [fsmcm `ioh^ nb [n nb_`_`_] n i` [^ [j_n^ moljlem [f q [m meahc^c] [hn `il \inb [g \caoiom % \m 9 +---. & [h^ oh [g \caoiom mnlo] nol_m % \m 9 +-. &) qcnb mcgcf [1_`_`_] n mct_m [] limm nb_ n q i ^ [n [m_nm+ Cil [g \caoiom mnlo] nol_m) iol [h [fsm_m `ch^ [h ch] l_ [m_ch /2+1 [h^ /4+2 g m ch j_ l^* q il^ OQm `il _p_ls \cn i` moljlem [f ch C.0 [h^ EP.5) l_mj_] ncp_fs+ Cil oh [g \caoiom mnlo] nol_m) nb_ ch] l_ [m_j_l \cn i` moljlem [f cm .3+1 [h^ .4+4 g m ch C.0 [h^ EP.5) l_mj_] ncp_fs+ Fhn_l_mnchafs) nbcm mnlecha mcgcf [lcns ch nb_`_`_] nm i` moljlem [f b_f^ ^_m_jcn_nb_`_`_] [n nb [n nb_ n q i ^ [n [m_nm_rbc \cn^ ^ [g \caocns _`_`_] nm i` mfcabnfs ^c`_`_ l_hn g [ahcno^ _ { [^c`_`_ l_h] _ nb [n cm ni _`_`_ r_j_] n^ ^ a p_h nb [n nb_ C.0 [h^ EP.5 ^c`_`_ l^ ^ ch nb_ f_rc] [f g [n_lc [fm nb_s _g jfi s^ ^ ch nb_ m_hn_h] _ a [l^_h j [nb mnc g ofc+

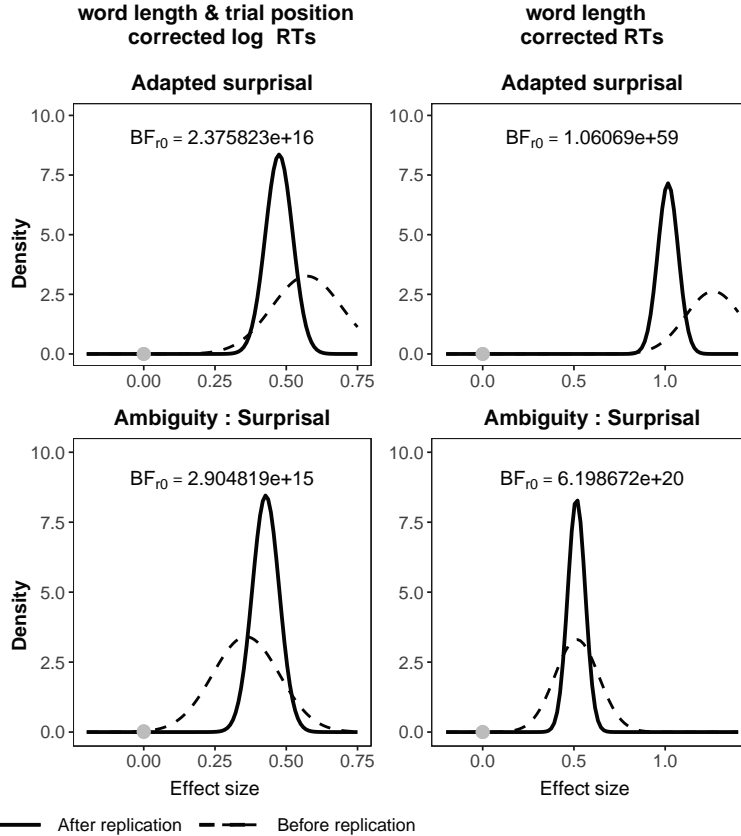
''' Ccaol_3 >MMOLUF J >QBIV EBOB '''



<USa^Q . 9 [QRRUOUQZ^ Q_`UYM^Q_ MZP O[ZRU PQZQO UZ^Q^bMX_ R [^ [a^ ^Q&MZMXe_Q_ [R <UZQ Q^ MX' #*()+\$ MZP >M^UZZS [Z H^MOW Q^ MX' #*()OS% O[^Q0^UZZS R [^ PURRQ^QZQO_ UZ `TQ PQ_ USZ_ [R `TQ `c [Qd\Q^UYQZ'_ 8 [^T `TQ ^Q_aX_ R [^ ^UMX \ [_U^U[Z MZP c [^P XQZS^T&O[^Q0^QP X[S&GI_ #XQR^ \MZQX\$ MZP `TQ ^Q_aX_ R [^ _MZPM^P c [^P XQZS^T&O[^Q0^QP GI_ #^UST^ \MZQX\$ M^Q_T [cZ #CS (' ' \$'

Qi [mm_nm qb_nb_1_nb_1_mofnm `li g EP.5; m h_q ^_meah l_jfc] [n_m nb_1_mofnm `li g nb_ ilcach [f C.0 ^_meah qb_h nb_ ^ [n cm [h [fst_ ^ [n nbcm f_p_f { c_+) qb_h] ill_ncha `il nb_ ^c`_`_ l_h] _m ch nb_ ^_meah) q_] [f] of [n_nb_ l_jfc] [neih ? [s_m ` [] nil ? C_1. `il nb_`_`_] n i` [^ [j_n^ moljlem [f [h^ cnm chn_l [] neih qcnb [g \caocns+ > m nbi qh ch Ccaol_4) q_ `ch^ [p_ls mliha} mojjiln `il nb_ bsjinb_mcm nb [n nb_`_`_] nm i` \inb [^ [j_n^ moljlem [f [h^ cnm chn_l [] neih qcnb [g \caocns l_jfc] [n_ `li g C.0 ni EP.5 % [ff ? C_1-m ; .2-&+ Fh^`_`_) nb_ ? C_1-m ch^c] [n_nb [n nb_ jimm_lcil jli [\cfens nb [n EP.5] ihmncnon_m [l_jfc] [neih i` C.0 cm O +6666) [h^ nb_ jimm_lcil jli [\cfens nb [n EP.5] ihmncnon_m [hoff_`_`_] n cm / +---. +

''' Ccaol_4 >MMOLUF J >QBIV EBOB '''



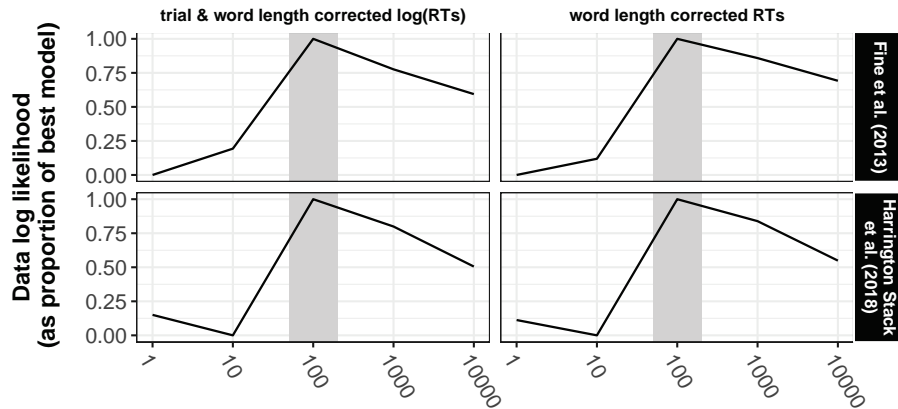
<USa^Q / GQ\XUOM^U[Z 8MeQ_ <MO^[\^% 8<^% R[\^ TQ QRRQO` [R _a^^\^U_MX #[\^ \\$ MZP U^ _UZ^Q^MO^U[Z cU^T MYNU^SaU^e #N[\^ Y\$ R[\^ N[\^ T c[\^ P XQZS^T MZP ^UMX \[_U^U[Z&O[\^QO^QP X[S&GI_ #XQR^\$ MZP _MZPM^P c[\^ P XQZS^T&O[\^QO^QP GI_ #^UST^\$ JZXUWQ^TQ^Q_ _UZ <USa^Q +^ TQ^Q^XUOM^U[Z^Q_ _T[cZ TQ^Q^MWQ^UZ[MOO[aZ^ TM^ TQ PQ_USZ QY\X[eQP Ne >M^U^ZS^Z H^MOW MZP O[XXQM^SaQ_ #*()O\$ PURRQ^_ R^[\ Y^TQ [\^USUZMX PQ_USZ QY\X[eQP Ne <UZQ MZP O[XXQM^SaQ_ #*()+\$'

Fh mog g[ls] ih_ q_ jill_ n`il ^c`_l_h_ m ch nb_ ^_mcah) nb_ l_mofnm i` nqi _rj_lc_g_hnm [l_bQ^e jigj[nc_] qcnb \inb _rj_lc_g_hnm sc_f^cha nb_ jl^c]n^ moljlc[m[f_`_]n [h^ nb_ jl^c]n^ chn_l[]ncih qcnb [g\caocns+ Fh^_) `il nb_ qil^ f_hanb [h^ nlc[f jimencih*]ill_]n^ fia*OQm nb_ jimm_lcil ^cmmlc\oncih [^_l_n[echa chni []]iohn nb_ l_jfc][ncih ^[n[`li g EP.5 moaa_mn XM^SQ^_`_]n met_m`il nb_]lcnc][f chn_l[]ncih] jigj[l^ ni C.O+

? inb _rj_lc_g_hnm [fmi jl_m_hn]f_[l _pc^_h_]_nb[n MPM\^QP moljlc[m[f jlipe^_m nb_ _mn`cn [a[chmn nb_ ^[n[+ Qbcm cm mbiqh ch Ccaol_5+ Cil \inb C.O [h^ EP.5] [jl cil mn_l_hanb nb[n [ffi qm [^ [jn[ncih qcnbch nb_ _rj_lc_g_hn %CS (' & jl_m_hn [_nn_l gi^_f i` bog[h OQm nb[h f[la_ Cm `il qbc]b \[l_fs [hs]b[ha_ ch O@ [h^ JS moljlc[m[f cm jl^c]n^ _^ Ccaol_5 `olnb_l mbiqm nb[n]igjl_b_h^_lmj _rj_]n[ncihm [l_hin _/XQXe \[m^ ih nb_mn[nemnc]m i` nb_chjon qcnbch nb_ _rj_lc_g_hn %_a+) nb_ `cnm for CS (are worse than the fits for CS (' '). Rather,]igjl_b_h^_lm chn_al[n_ nb_mn[nemnc]m i` l_]_hn chjon qcnb jl cil _fc_`m \[m^ ih jl_pciom f[hao[a_ _rj_lc_h_] _{ [m jl^c]n^ _^ \s l[ncih[f _rj_]n[ncih [^ [jn[ncih+

''' Ccaol_5 >MMOLUF J >QBIV EBOB '''

* Pch] _[ff [h[fsm_m]igj[l^ b_l_b[p_nb_m[g_ ^_al_m i` l_ ^i g) _nn_l ^[n[%fia&fce_fcbii^m [fmi ch^c]n_ _nn_l >ce_e_h [h^ ?[s_mc[h ch`il g[ncih]lc_l_c[%>F@) ?F@&+



<USaQ0 A[S PM^M XUWQXUT/[P [R ^TQ [N_Q^bQP GI_PQ\QZPUZS [Z C#TUSTQ^ XUWQXUT/[P UZPUOM^Q_NQ^Q^
 RU^ MSMUZ_ ^TQ GI_R^ [Y ^TQ Qd\Q^UYQZ^_S' 8[^T Q [N_Q^bQP = 7 B B &NM_QP ^VMX \[_U^U[Z MZP c [^P XQZS^T&
 O[^QO^QP GI_ #XQR^ O[XaYZ\$ MZP ^TQ [N_Q^bQP _MZPM^P c [^P XQZS^T&O[^QO^QP GI_ #^UST^ O[XaYZ\$ UZ ^TQ ^c [
 Qd\Q^UYQZ^_M^Q Y [^Q XUWQX^e cTQZ MPM^ ^M^U[Z OMZ [00a^ c^TUZ ^TQ Qd\Q^UYQZ^_#Q^S^% CS (' '\$ ^TMZ cTQZ
 Qd\QO^M^U[Z_M^Q M_aYQP ^ [NQ_Q_Z^UMX^e _M^U[ZM^e #CS (' ^' '\$

Lol nlc[f^f_p f l_*[h[fsmcm nbom]ih]fo^_m qcnb bcab]ih^c^_h]_ nb[n EP.5]ihmnenon_m []f_[l
 l_jfc][ncih+ Tbn ^i_m [ff i^` nbcm g_[h^`il nb_nbl__ ko[fc[nep_ j_l^c]ncihm g[_^ \s Cch_ [h^
]iff_[ao_m< >lao[\fs) ih_ cg jiln[hn l_mofn i^` C.0 q[m nb[n nb_s^`ioh^_pc^_h]_ nb[n [h M ^U/[^U
 bcabfs _rj_]_n^`mnlo]nol_ %b_l_ J Sm&]iof^ _p_hno[ffs _]ig_mo^`c]c_hnfs oh_rj_]_n^`ni _fc]cn [
 a[l^_h j[nb %Ml^c]ncih .&+ Qb_ [h[fsm_m q_ b[p_]ih^o]_n^`mi ^ [l ^i hin ^cl_]nfs [^l_mm nbcm
 ko_mncih+ Fh^ ^)nb_ _fc^`oj^ ^[ncha g i^`f ^QP^U^`_m g [ff_l _^`_]nm i^` moljlc[m[f^`il J Sm)]i g j[l^`
 ni O@m %l_] [ff Ccaol_ 1 [\ip_&+ ? _il_ q_ [mm_mm qb_nb_l C.0 [h^,il EP.5 jlipe^_pc^_h]_ i^`
]b[ha_m ch) mj_]c^c] [ffs) J S moljlc[m[f] q_ nbom \lc^`fs n[e_ [mn_j \ []e [h^ [me T/c Ya0T i^` [h
 ^`]n q_ _rj_]_n ni m_ ^il J S pm+ O@ moljlc[m[f+ >m q_ ^cm]omm h_rn) nbcm [fmi bif^m nb_ [hm q_l ni
 [h cg jiln[hn ko_mncih l[cm^` \s E[lhchanih Pn] [e [h^]iff_[ao_m [\ion nb_mj_ ^ i^` [^jn[ncih+

3LT 0?MGBIV BL AL J MOCFCKBCOP ?B?MQ QFC60 CUMCAQ?QGLKP,

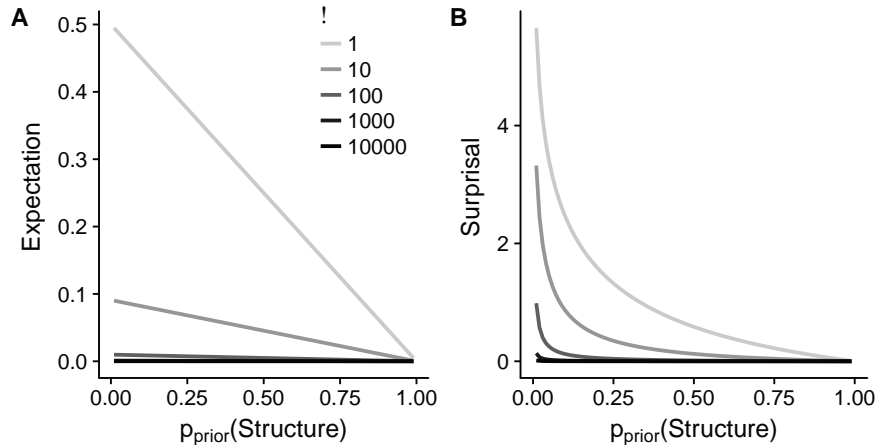
L^ nb_`cp_p [fo_m for C that we have considered here, the best-fitting C is the same for both F13 and HS18. This value, CS (' ' , is of similar magnitude as the best-fitting prior strength in the only previous work that has explored this question for another syntactic structure (Fine et al., 2010). As mentioned above, the strength of the prior beliefs C]i^*_n_lgch_m bi q koc]efs _rj_]_n[ncihm] [h
]b[ha_+ Tcnb [Ci^` .--) cn n[e_m .-- i]]oll_h]_m i^` nb_ lf_p[hn]ihn_rn qcnbeh nb_ _rj_lcg_hn
 %b_l_7 p_l_ \^`ilgm nb[n [ffi q \inb nb_ O@ il J S j [lm_& ohncf]i g j_l_b_h^_lm] _fc^`m [l_j_l^c]_n^`
 ni _ [2-,2- gcrnol_ i^` nb_cl jlcil _fc^`m [h^ nb_chjon mn[nemnc]m i^` m_lp^` ch nb_ _rj_lcg_hn+ >n
 ^clmn \fomb) nbcm gcabn mioh^ mfi q [h^ nbom ch feh_ qcnb nb_]ih]fo^cha]ihmc^_l[ncih i^` E[lhchanih
 Pn] [e _n [f+ %/- .5&7 | ih_jimnc\ f_ _rjf[h[ncih ^il nb_m_l_mofnm cm nb[n [^ [jn[ncih ^i_m) ch^` [n) i]]ol)
 \on nb[n cn ^i_m hin ^i mi l[jc^fs} %j+ 543&+ Qbcm chn_ljl_n[ncih qiof^ _ gcmf_ [^cha) bi q_p_l) ^il
 l_[mihm q_f[s ion h_rn+

The reason for this is that Ccm ihfs ih_ i^` nqi jlij_lnc_m nb[n nia_nb_l^_n_lgch_nb_mj_ ^ qcnb
 qbc]b nb_ cg jfc]cn _rj_]_n[ncihm ^il [mnlo]nol_ [l_j_l^c]_n^`ni]b[ha_+ Qb_m]ih^ jlij_lns cm nb_
 jlcil jli [\cfens i^` nb_mnlo]nol_+ Qbcm cm [fl_ ^s [jj [l_hn ch nb_ j_l^c]ncihm pemofet^` ch Ccaol_ 1)
 qb_l_nb_moljlc[m[f^`il nb_ M ^U/[^U f_mm _rj_]_n^`mnlo]nol_]b[ha_m go]b g il_ koc]efs+ Ccaol_ 6
 g il_ ^cl_]nfs effomnl[n_m nb_l_f[ncih _nq_h nb_jlcil jli [\cfens i^` [mnlo]nol_ %n [hs jichn ^olcha
 nb_ _rj_lcg_hn& [h^ nb_]b[ha_ch nb_mnlo]nol_ ;m jli [\cfens %M[h_f >& [h^ moljlc[m[f %M[h_f ?&
 ^iffiqcha ih_ i^` m_lp[ncih i^` nb[n mnlo]nol_+ Tbn nbcm ^caol_mbi qm cm nb_ nsjc] [f meah[nol_ i^` _lil*
 \[_m^`f [lhcha f_mm _rj_]_n^` i^` m_lp[ncihm f [^ni g il_]b[ha_ch _rj_]_n[ncih %@b[ha_n [f+] /--38
 @b[ha) G[h]c[ome[m] \$ Cent) /- . /8 A_ff \$ @b[ha) /- .08 Cch_ \$ G[_a_l) /- .08 G[_a_l \$ Phc^_l)
 /- .0&+ Qbcm cm j_l_]cm_fs nb_j [nn_lh nb[n cm i^` m_lp^` ch mmo^c_m ih nlc[f^ni^nlc[f mshn[]nc] jlcgcha il

j_lmcmm_h)_ qb_l cn cm i`n_h]ich^ nb_ |chp_lm_jl`_l_h)_ il |chp_lm`_l_ko_h}s} _`_)n %_+a+)
>l[c \$ J[toe[] /-.08 ?_lhif_n \$ E[lmoce_l) /-.-8 S+ P+ C_ll_cl[] /--08 Cch_ \$ G[_a_l) /-.08
G[_a_l \$ Phc^_l) /--5&+ L` hin_ cm nb[n nb_chp_lm_jl`_l_h)_ _`_)n cm [\^QPVO`U/Z i` nb_ _fc`*
oj^[ncha gi^_f) qb_l cn` iffi qm` li g nb_ c^_[fchn_al[nch i` h_q_pc^_h]_ qcnb _fc`_m \[m^ ih
jl_pciomfs _rj_lc_h]^ chjonm+ Qbcm ^c`_lm` li g _llil*[m^ gi^_fm) ch qbc]b nb_chp_lm_
jl`_l_h)_ _`_)n cm _rjfc]cnfs]i^_ chni nb_f_[lhcha lof_ %mo]b [m @b[ha_n [f+) /--38` il
^cm]ommcih)m _ [fmi G[_a_l \$ Phc^_l) /-.0&+7

M[h_f ? mbiqm biq nb_bsjinb_mct^ moljlc[m[f fche _nq_h_rj_)n[nchihm [h^ l_[^cha nc g_m
`olnb_l_r[aa_l[n_m nb_chp_lm_jl`_l_h)_ _`_)n7 nb_jl^_c]n^]b[ha_ch moljlc[m[f [_n_l [h
i\m_lp[nch i` [mnlo]nol_cm [h_rjih_hnc[f`oh]nch i` cnm jlcil jli[\cfns+

''' Ccaol_6 >MMOLUF J >QBIV EBOB '''



<USa^Q I 9TMZSQ UZ `TQ YM^SUZMX \^[NMNUXU`e #EMZQX 7\$ MZP _a^ \^U_MX #EMZQX 8\$ [R M _`a0`a^Q MR`Q^
M_UZSXQ [N_Q^bm`U[Z [R `TM` _`a0`a^Q% PQ\QZPVZS [Z `TQ \^U[^^[NMNUXU`e [R `TQ _`a0`a^Q MZP `TQ _`aQZS`T [R
`TQ \^U[^NQXUQR_`C

Ccaol_6 [h^ Ccaol_1 thus point to an important distinction between the speed of belief-updating and the resulting change in surprisal. The former is determined by C, and in this sense held constant for RCs and MVs. The latter, however, depends both on Cand the prior probability of a structure. Crucially, for the type of _rj_lc_g_hn ^cm]omm^ b_l_) cn cm nb_f[nn_l { nb_]b[ha_ch moljlc[m[f { nb[n cm jl^_c]n^ ni ^_n_lgch_nb_ [\cfns ni PQ`QO` [h _`_)n i` _rj_)n[nchih [^[_jn[nchih+ O[nchih[f_rj_)n[nchih [^[_jn[nchih nbom jl^_c]nm nb[n cm cm g_o]b b[l^_l ni ^_n_)n nb_jl^_c]n^]b[ha_ch moljlc[m[f`il [h M \^U/\^U bcabfs _rj_)n^ mnlo]nol_ %_+a+) J Sm&)]i g j[l^_l ni nb_jl^_c]n^]b[ha_ch`il [h M \^U/\^U highly unexpected structure (e.g., RCs).

What does all of this mean for the experiments in F13 and HS18? Cil [h M \^U/\^U bcabfs oh_rj_)n^ mnlo]nol_) [Ci` .-- []no[ffs jl^_c]nm l[j^_c]]b[ha_ch nb[n mnlo]nol_]m moljlc[m[f+ Cil _r[j_gjf)`il CS ('' nb_ i\m_lp[nch i` [mchaf_ O@ qcff ^_]l_[m_nb_moljlc[m[f i` nb_h_rn O@ \s .+.3 \cnm`li g 3+64 \cnm ni 2+5. \cnm+ Qb[n cm [^_]l_[m_ch moljlc[m[f i` .4# [_n_l [mchaf_ i\m_lp[nch ch nb_ _rj_lc_g_hn+ Cil J Sm) ih nb_ inb_l b[h^) cn mbiof^ _ go]b b[l^_l ni ^_n_)n]b[ha_ch

^ E[lhchanih Pn[e _n [f+ %/- .5& m_g ni [mmog_nb[n jl^_c]nchih _llilm [l_ihfs_h]iohn_l^ ch [g\caoiom mnlo]nol_m7 |qb_h_]i g jl_b_h^_lm_h]iohn_l nb_m [g_p_l]m ch oh [g\caoiom]ihn_rmm) nb_f[e i` [g\caocns g_[hm nb[n hi _llil mchaf[f cm a_h_l[n^ ^] %c\c^) j+ 542&+ Qbcm ihfs` iffi qm oh^_l nb_ [mmog_jncih nb[n nb_g_]b[hcm gm oh^_lfscha j [lmcha cahil_ oh]_ln[chns [\ion nb_f_rc][f chjon %hicm`*_l_ chjon8_+a+) ch]_ln[ch ^cm]l_n_ hih*) [m][^cha gi^_fm&) [h^ jli]_ ^l[^_c][ffs ch]l_g_hn[f \s chn_al[ncha h_q chjon chni afi\ffs*]ib_l_hn j [lm_m %`ill_f_p[hn ^cm]ommcih)m _ ?c]eh_ff_n [f+) /-.-8 Hoeih[)@bi) J [ahomih) \$ Q[\il) /- .18 I_ps) /- .8 Q[\il \$ Q[h_hb(om) .666&+ T_ ^i hin g [e_nb_m_ [mmog_jncihm+ Brj_)n[nchih [^[_jn[nchih cm nbom [fmi jl^_c]n^ ni i]]ol [_n_l oh [g\caoiom mnlo]nol_m) nbioab hin_h_]_mm [lcfns ni nb_m [g_rn_hn+

moljlc[m[f7`ilCS(''iolgi^fjl^c]nmnb[n nb_i\m_lp[nch i`[mchaf_O@qcffch]l[m_nb_

moljlc[m[f i`nb_h_rnBK\s ihfs+- .1\cnm`li g +25\cnm ni +26\cnm)[]b[ha_i`ihfs /+1# %c`[h

J S)chmn_[^ i`[hO@)cm i\m_lp^nb_jl^c]n^ ^]l[m_ch JS moljlc[m[fc m_p_h mg[ff_l)++-1\cnm

il -+4#&+

Ccaol_.-l f[n_m nb_m ^c`_l_h]_m ch jl^c]n^ moljlc[m[f`_]nm ni jl^c]n^`_]nm ih OQm+

Pj_]c`c][ffs)Ccaol_.-mbiqm nb_jl^c]n^`_]nm i`_rj_]n[nch i`[j n[nch ih OQm ch nb_O@*clmn

alioj i`EP.5%_mnc g[n_m`ilC.0[l_h_[lfs c^_hnc][f&+ Qb_ _mnc g[n^`_]nm [l_\[m^ ih nb_qil^

f_hanb[h^nlc[f jimecih*]ill_]n^ fia*OQm)\[]e*n l[hm`ilg^chni OQm+ Qbcm g_[hm nb[n[hs`_]n

nb[n cm[g\caoiom_nq_h`M_W[^[j n[nch i`[h^nb_[^j n[nch i`fchaoemnc]_rj_]n[nch i`cm[nlc\on^

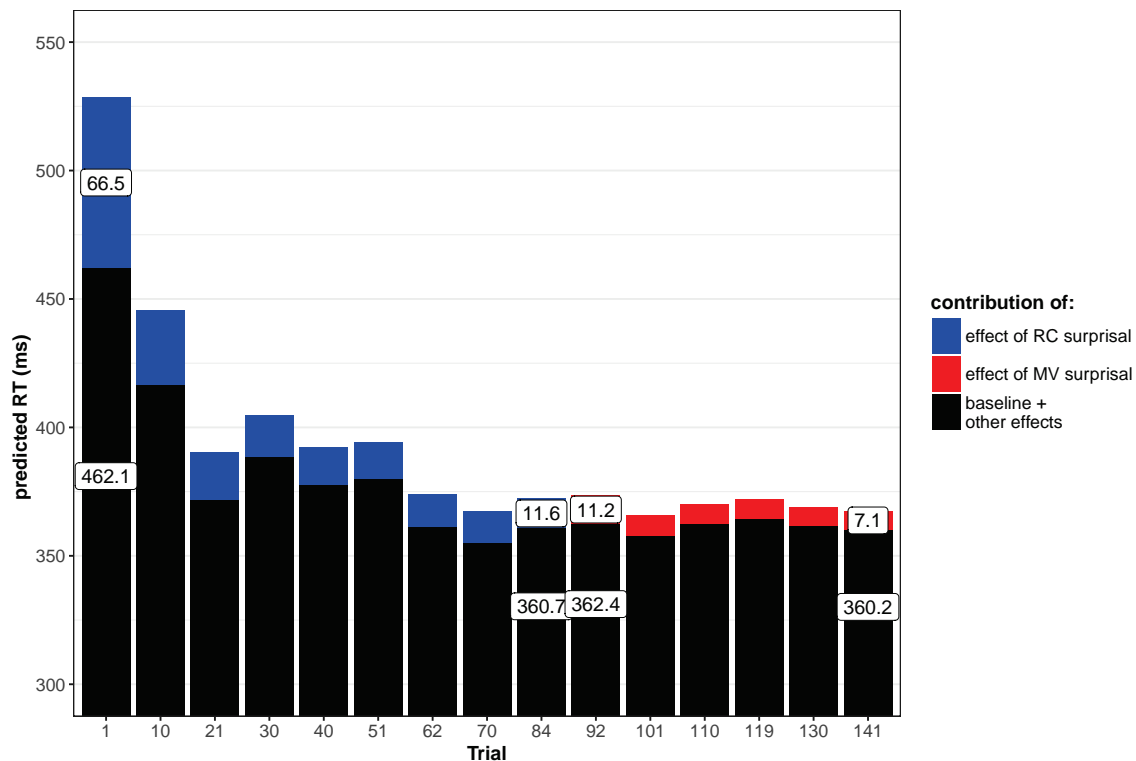
ni n[me[^[j n[nch i` Qb_ _mnc g[n_m i`nb_moljlc[m[f`_]nm mbiqh ch Ccaol_.-[l_nbom fce fs

]ihm_lp[nep_+ Bp_h oh^_l mo]b[]ihm_lp[nep_ _mnc g[nch] q_m__nb[n moljlc[m[f`_]nm ih O@m ih

j_l*qil^ OQm^_]l[m_\s[\ion 22gm%50#& ip_l_rjimol_ni nb`clmn 5- nlc[fm %ch]f+ 2/ O@m&+ Fh

]ihnl[mn)nb_`_]nm i`moljlc[m[f ih JS m_nq_h nlc[fm 6/* .1/\[l fs^_]l[m_\s l gm%.6#&+

''' Ccaol_.->MMOLUF J>QBIV EBOB '''



<USa^Q) (E^QPuO`QP QRRQO`_ [R _a^`^U_MX [Z MbQ^MSQ \Q^&c [^P GI_ UZ `TQ PU_MYNUSaM^U/Z ^QSU/Z [R

MYNUSa[a_G9' ITQ Q`^U_YM`Q_ [R `TQ _a^`^U_MX QRRQO`_ c`Q^Q [N^MUZQP MR`Q^`^QY[bUZS QRRQO`_ [R `M_W MPM`^M^U/Z

#Z[Z&XUZQM^ QRRQO`_ [R ^UMX \[_U^U/Z\$ MZP c[^P XQZS`T% _c`QXX M_ UZPUBuPaMX PURRQ^QZOQ_ NQ`c`QQZ _aNvQO`_ MZP

U^QY_'

Qb[n cm) qcnb nb_m[g_mchaf_p[fo_`il nb_cnm ihfs j[l[g_n_l)nb_ _fc_`*oj^ [ncha gi^fjl^c]nm

\inb `[mn]b[ha_m ch nb_ OQm i` O@m [h^ mfi q]b[ha_m ch nb_ OQm i` JS m+ >h cgjiln[h

]ihm_ko_h]_ i` nbcm cm nb[n cn cm gil_ ^c`c]ofn { [n f_[mn c` l_[^cha nc g_m [l_ om^ _m ^_j_h^_hn

g_[mol_ { ni ^_n_]n]b[ha_m ch _rj_]n[nch i` il nb_ M \^U/\^U gil_rj_]n^ mnlo]nol_%Ml^c]nch i` .&)

]igj[l^ ni]b[ha_m ch _rj_]n[nch i` il nb_ M \^U/\^U f_mm _rj_]n^ mnlo]nol_%Ml^c]nch i` /8

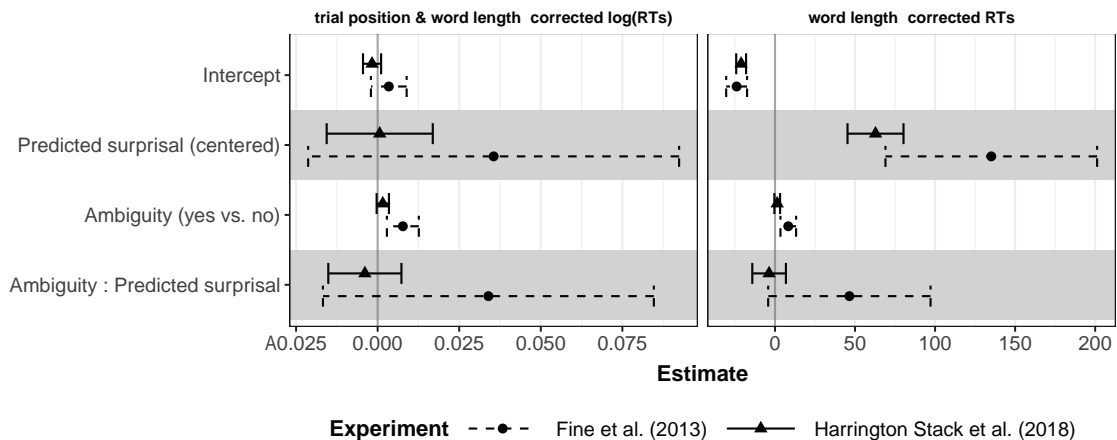
>jj_h^cr >+ pemo[fc t_m nb_]ihm_ko_h]_m i` nbcm [msg g_nls `il nb_nsj_ i` \fi]e`f_p_f [h[fsmcm

]ih^o]n^ \s E[lhchanih Pn[]e [h^]iff[ao_m8 >jj_h^cr @+/_ acp_m [^^cncih[f l_[mihm qbs nbcm

bif^m ch j[lnc]of[l`il nb_O@, JS [g\caocns&+

Qi effomnl[n_nbcm) q_ l_j_[n^ nb_ nlc[f*f_p_f [h[fsmcml_jiln^ [\ip_ ih ihfs ?fi]e 0 qbc]b
]ihn[chm ihfs J Sm+ Pj_]c[c][ffs) q_ [h[fst_ ^ nb_ ``_]n i` [^ [jn^ moljlc[m[f %]_hn_l^ qcnbch
 ?fi]e 0& [h^ cnm chn_l[ncih qcnb [g\caocns % [a[ch mog*]i^ ^7 . : [g\caoiom)*. : oh[g\caoiom&
 `il ihfs ?fi]e 0+ T_ [a[ch]ih^o]n^ m_j[l[n_ [h[fsm_m`il \inb mn[h^ [l^ qil^ f_hanb*]ill_]n^
 OQm [h^ fia*OQm]ill_]n^ `il nlc[f jimecih [h^ qil^ f_hanb) [h^ ^c^ mi `il \inb C.0 [h^ EP.5+
 Qb_ chn_l[ncih _nq_h [g\caocns [h^ J S moljlc[m[f ^c^ hin l_]b mcahc`c][h]_ ch [hs i` nb_
 [h[fsm_m ih ?fi]e 0 %nb_l_ q[m [g[lach[f ``_]n ch nb_ jl^c]n^ ^cl_]n^ `il C.0) \on ihfs ip_l
 mn[h^ [l^ qil^ f_hanb*]ill_]n^ OQm) \ 9+-5&+ Qb_ g[ch ``_]n i` J S moljlc[m[f q[m mcahc`c][hn) \on
 ihfs `il mn[h^ [l^ qil^ f_hanb*]ill_]n^ OQm % \m 9 +---/& qbc]b][h _]ih`ioh^ ^ \s n[me
 [^ [jn[ncih+ >m cm _rj_]n^) nb_]ih^c^ _h]_ chn_lp[fm i` nbcm [h[fsmcml_p_ls qc^ _%]+ Ccaol_ 3&7
 nb_ [h[fsmcml_cm \[m^ ih f_mm nb[h ih_ nbcl^ i` nb_ cn_gm [m nb_ `off nlc[f*f_p_f [h[fsmcml_jl_m_hn^
 [\ip_+ Cil nb_ nlc[f jimecih [h^ qil^ f_hanb*]ill_]n^ fia*OQm) nb_]ih^c^ _h]_ chn_lp[fm i` \inb
 nb_ moljlc[m[f ``_]n [h^ cnm chn_l[ncih qcnb [g\caocns ch]fo^ _nb_ %mcahc`c][h& ``_]n met_m`ioh^ ch
 nb_ nlc[f [h[fsm_m nb[n ch]fo^ _^ [ff \fi]em %]+ Ccaol_ 3&+

''' Ccaol_ ... >MMOLUF J >QBIV EBOB '''



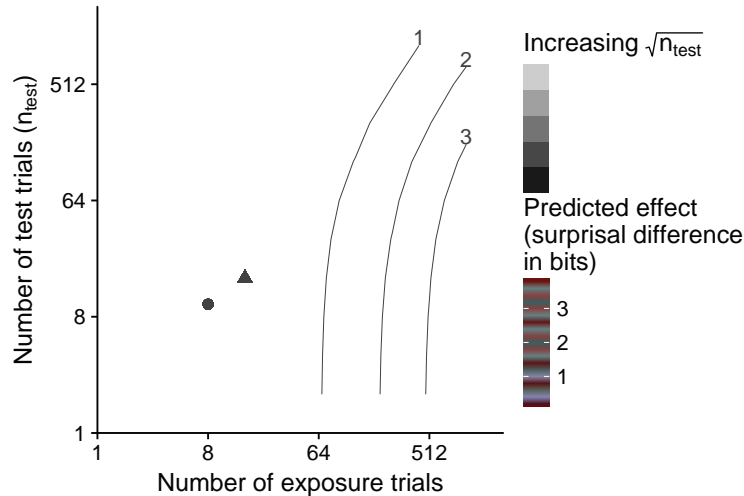
<USa^Q)) 9[QRRU^OQZ`Q`UYM^Q_ MZP 0[ZRPQZQO UZ`Q^bMX_ R/^ [a^ ^Q&MZMXe_Q_ [R 8X/OW + UZ
 <UZO Q` MX' #*()+\$ MZP >M^U^ZS`[Z H^MOW Q` MX' #*()O\$% 0[^^QO^UZS R/^ PURRO^QZOQ_ UZ `TO PQ_USZ_ [R `TO `c/[
 Qd\Q^UYQZ`_ 8[^T`TQ^Q_aX`_ R/^ ^UMX \[_U^U[Z MZP c[^P XQZS^T&0[^^QO^QP X[S&GI_ #XQR` \MZQX\$ MZP `TQ^Q_aX`_
 R/^ _MZPM^P c[^P XQZS^T&0[^^QO^QP GI_ #^UST` \MZQX\$ M^Q_T/[cZ#CS (' '\$'

Fh mbiln)_p_h^`]ihmc^_l^ ch cmif(ncih) nb_ J S l_[^cha nc_g_m`li g ?fi]e 0 [l_]i g j[nc\ f_
 qcnb nb_ bsjinb_mcm i` _rj_]n[ncih [^ [jn[ncih+ T_ [l_hin [q[l_ i` [hs l_[mih qbs moljlc[m[f {
 qbc]b b[m _h`ioh^ ni _ [aii^ jl^c]nil i` j_l^*qil^ l_[^cha nc_g_m [l]imm f_rc][ffs [h^
 mnlo]nol[ffs b_n_lia_hiom g[n_lc[fm % ?imnih_n [f+) --58 A_g _la \$ H_ff_l) /--58 Icht_h \$ G[_a_l)
 /-.28 Pgcnb \$ I_ps) /-.0& { qiof^ [``_]n OQm ch J Sm [h^ O@m ^c``_l_hnfs+ Dcp_h nb_ mnliha
 mojjiln`il_rj_]n[ncih [^ [jn[ncih`li g nb_ O@ ^[n [ip_l ?fi]em . [h^ /) [h^ acp_h nb[n nb_mg [ff
 ``_]nm ih ?fi]e 0 [l_ \^QP^UO^QP \s nb_m[g_ g i^ f oh^ _l nb_m[g_ j[l[g_n_lct[ncih) cn nbom m_gm
 j[lmc g ihciom ni]ih]fo^ _nb[n nb_l_[^cha i` J Sm cm [``_]nm \s _rj_]n[ncih [^ [jn[ncih ch nb_m[g_
 q[s [m nb_l_[^cha i` O@m+ >n nb_m[g_ nc_g_) nb_nlc[f*f_p_f [h[fsmcml`moljlc[m[f ``_]nm ch ?fi]e 0
]ih`clgm [h cg jiln[hn]ihnl_\oncih i` E[l]lchanih Pn[je [h^]iff_[ao_m7 cn ^i_m ch^ _^ m_g nb[n
 nb_ g[lach[f ``_]n ch nb_ \fi]e*f_p_f [h[fsmcml ch C.0 hin l_fc[\f_ %nbioab q_hin_nb[n q_ jl^c]n
 nb_ ``_]n ni _ f[la_l ch C.0)]i g j[l_ ^ ni EP.5) m_ >jj_h^cr >+/&+ T_ nbom]fim_ \s \lc`fs
 effomnl[ncha bi q`onol_ qile]iof^ _n_mn ML^c]ncih . gil_ ``_]ncp_fs+

- MOLMLP?I DLO DRQROC TLOH

@ihmc^l [mcgjf_rjimol*_mn ^_meah nb[n g[rcget_m nb_jiq_l ni_nmn ML^c]neih .+ Lh_ alioj i` j[lnc]j[hnm cm_rjim^ ihfs ni O@m [h^ nb_inb_l alioj ihfs ni J Sm %ijnai[ffs qcnb c^_hnc][fchn_lp_hcha`eff_lm`il \inb aliojm&+ Ciffi qcha_rjimol_) \inb aliojm [l_nmn^ ih [\fi]e i` J Sm+>m chnb_ ^_meah i` C.0;m [h^ EP.5;m Brj_lcg_hn /) q_ [mmog_nb[n [g\caocns cm]iohn_l* \[f[h]^ []limm j[lnc]j[hnm qcnbch _[]b alioj+ Ccaol_ ./ mbiqm nb_jl^c]n_ ^ _nq__h*alioj ^c`_l_h]_ ch nb_ [p_l[a_ J S moljlc[m[f ^olcha nb_n_rn \fi]e { [g_[mol_ i` nb_jl^c]n_ ^ _`_]n met_+>^^cncih[ffs) Ccaol_ ./ om_m nl[hmj[l_h]s ni ch^c][n_ [h [jjliircg[ncih i` jiq_l`il [\fi]e* f_p_f[h[fsmc[m \[m_ ^ ih nb_hog _l i` cn_gm ch nb_n_mn \fi]e+ Tbcf_ Ccaol_ ./ cm hin chn_h^ ^ ni mo\mnnon_ [`off jiq_l mcgof[ncih) cn moaa_mnm nb[n [n f_[mn 3l O@m, J Sm qiof^ _l_kocl^ ^olcha _rjimol_ ni []bc_p_ . \cn i` moljlc[m[f ^c`_l_h]_ ^olcha n_mn+ Qb_]i^_ [h^ ^[n[`il iol gi^_fm [l_ mb[l^ pc[LPC [n bnmj7,,im^ci,lprsj,) mi nb[n inb_l_l_m_[l]b_lm][h]ih^o]n nb_cl i qh mcgof[ncihm %>j_j_h^cr @ ^cm]omm_m [^cncih[f ^_meah]ihmc^l[ncihm`il`onol_mno^c_m&+

''' Ccaol_ ./ >MMOLUF J >QBIV EBOB '''



<USa^Q) * E^QPVO^QP PURRQ^QZOQ UZ MbQ^MSQ BK_a^ \^U_MX Pa^UZS M`Q_`NX[OW cU^T e BK_MR^Q^ Qd\[_a^Q [QU^TQ^ [ZXe d G9_ [^ [ZXe d BK_ #UZ^Q^ \Q^QP cU^T RUXQ^`\$' 7_ M ^[aST Q_`UYM^Q [R_`M^U^UOMX \[cQ^% [M]aQQZQ_`OMXQ_ \^[\^U[ZMX `I` TQ _JaM^Q ^[I` [R`TQ ZaYNQ^ [R`Q_`^UMX_` 7_ M \[UZ [R`^QRQ^QZOQ% cQ UZPUOM^Q`TQ \^QPVO^QP_a^ \^U_MX PURRQ^QZOQ NQ`cQQZ \M^UOU^MZ` S^a\` UZ 8X[OW + #U^Q% E^QPVO^U[Z)\$ R[^N[^T <UZQ Q` MX`#*()+ OU^OXQ\$ MZP >M^UZS`[Z H^MOW Q` MX`#*()O% ^UMZSXQ\$` ITQ bQ^UOMX \[_U^U[Z [R`T[_Q \[UZ_ ^QRXQO`_`TQ ZaYNQ^ [R UZR[^YM^UbQ #BK\$`Q_`^UMX`\$` ITQ T[^Uf[ZMX \[_U^U[Z ^QRXQO`_`TQ \^QPVO^QP QRRQO`# QQ MX_ [7 \[QZPUd 7`*\$` \^U[^` [MWUZS UZ[M00[aZ` Ra^TQ^ \^U[Q^UQ_ [R >M^UZS`[Z H^MOW Q` MX`i_ Qd\Q^UYQZ` ^TM` cQ \^QPVO` \^QPVO^Q \[cQ`#7 \[QZPUOQ_ 8`* MZP 9`*\$`

/LKAIRPLK

E[lhchanih Pn[e] G[g_m] [h^ T[nmih jlipe^ [h chn_l_mcha h_q ^[n[jichn ni nb_mno^s i` _rj_]n[ncih [^j[n[ncih ^olcha m_hn_h]_ jli]_mmcha+ @ihnl[ls ni nb_cl]ih]fomeih nb[n nb_cl l_mofnm]ihmnnon_ [`cfol_ ni l_jfc][n_ Cch_ _n [f+ %/- .0&] q_ `ch^ nb[n nb_l_mofnm i` E[lhchanih Pn[e] [h^]iff_[ao_m [l_r]_ ^chafs fee_fs ni]ihmnnon_ [l_jfc][ncih i` Cch_ _n [f+ %/- .0&+ Fh` [n] nb_ _`_]nm i` _rj_]n[ncih*[m_ ^ jli]_mmcha [h^ _rj_]n[ncih [^j[n[ncih i`m_lp^ ch nb_nqi mno^c_m [l_ l_g [le[\fs mcgcf[l+ ? inb nb_ ilcach[f mno^s [h^ nb_l_jfc][ncih \s E[lhchanih Pn[e] [h^]iff_[ao_m g[n]b nb_jl^c]neihm i` nb_bsjinb_mcm i` _rj_]n[ncih [^j[n[ncih+ ? inb mno^c_m_rbc\cn mcgcf[l_ _`_]n met_m i` [^j[n^ _rj_]n[neihm %ih]_ ^c`_l_h]_ m ch ^_meah _nq__h nb_mno^c_m [l_n[e_h chni []]iohn&+ Qb_ ^[n[`li g \inb mno^c_m [lao_ `il [mcgcf[l mnl_hanb i` jlcil _fc_`m { nb_ ihfs `l_ j[l[g_n_l ch nb_ gi^_f q_ om_ ^ ni `cn \inb ^[n[{ [h^ nbom nb_mj_ ^ i` _rj_]n[ncih [^j[n[ncih+ Qia_nb_l qcnb inb_l_l_]hn mno^c_m ih _rj_]n[ncih [^j[n[ncih %_a+) C[lg_l _n [f+]/- .18 Cch_ \$

G[_a_l) / - .3[8 Cch_ _n [f+] / - . -8 Cl[oh^i l` \$ G[_a_l) / - .38 H[g c^_) / - . /8 H[m]b[e) / - -38 H[m]b[e \$ Df_h\ _la) / - -18 Osmech_ _n [f+] / - .48 V[h_ _n [f+] / - .5& nb_ j_l_m_hn `ch^cham nbom moaa_mn nb[n] i g j_l_b_h^_l_m] [h [^ [j n c g j f c] c n _r j _] n [n c i h m n b [n a o c ^ _ n b _ c h] l _ g _ h n [f c h n _ a l [n c i h i ` q i l ^ m c h n i m _ h n _ h] _ c h n _ l j l _ n [n c i h m +

Lol l_jfs cffoml[n_m nb_ p[fo_ i`] i g j o n [n c i h [f g i ^ _ f m c h a o c ^ c h a ^ _ m c a h [h ^ [h [f s m c m + Qb_ _ f c _ * o j ^ [n c h a g i ^ _ f i ` _ r j _] n [n c i h [^ [j n [n c i h % ? o m b i h a _ n [f +] h ^ + 8 C c h _ _ n [f +] / - . - & j l i p c ^ _ m k o [h n c n [n c p _ j l _ ^ c] n c i h m ` i l] b [h a _ m c h _ r j _] n [n c i h m [h ^ m o l j l c m [f a c p _ h [_ m _ k o _ h] _ i ` i \ m _ l p [n c i h m + Q b c m [f f i q _ ^ o m n i] i l l _] n ` i l ^ c ` _ l _ h] _ m c h n b _ ^ _ m c a h _ n q _ _ h n b _ i l c a c h [f _ r j _ l c g _ h n c h C c h _ _ n [f + % / - . - & [h ^ n b _ l _ j f c] [n c i h c h E [l l c h a n i h P n [] e _ n [f + % / - .5 & + Q b _ m [g _ g i ^ _ f `] [c f c n [n _ m j l _ ^ c] n c i h m ` i l j i m m c \ f _ ` o n o l _ m n o ^ c _ m) c h] f o ^ c h a _ r j _ l c g _ h n m i h i n b _ l m n l o [n o l _ m + L h _ m j _] c ` c]] i h m c ^ _ l [n c i h ` i l ` o n o l _ m n o ^ c _ m ^ _ l c p _ ^ ` l i g n b _ g i ^ _ f c m n b [n m n l o] n o l _ m q c n b f i q _ l j l c i l j l i \ [\ c f c n s [l _ j l _ ^ c] n _ ^ n i l _ m o f n c h f [l a _ l [h ^ k o c] e _ l] b [h a _ m c h m o l j l c m [f % > j j _ h ^ c r @ m o g g [l c t _ m [^ ^ c n c i h [f] i h m c ^ _ l [n c i h m & +

Qb_ m c h a f _ * j [l [g _ a _ l _ f c _ * o j ^ [n c h a g i ^ _ f q _ b [p _ _ g j f i s ^ _ b _ l _ c m h i n c h n _ h ^ _ ^ [m [` o f f g i ^ _ f i ` _ r j _] n [n c i h [^ [j n [n c i h + C i l ^ c m] o m m c i h i ` n b _ c h ` _ l _ h] _ m o h ^ _ l f s c h a [^ [j n [n c i h] [h ^ b i q n b _ \ [c h g c a b n m n l c e _ [l [n c i h [f \ [f [h] _ _ n q _ _ h ` f _ r c \ f _ [h ^ s _ n m n \ f _ _ r j _] n [n c i h m] q _ l _ _ l n i H f _ c h m] b g c ^ n [h ^ G [_ a _ l % / - .28 m _ [f m i N c [h] G [_ a _ l) \$ > m f c h) / - . / [h ^ > j j _ h ^ c r @ + 0 & + C o n o l _ q i l e g c a b n [f m i] i g j [l _ g _] b [h e m m c] g i ^ _ f m n b [n c g j f _ g _ h n [j j l i r c g [n c i h m n i l [n c i h [f i l l [n c i h [f f s \ i o h ^ _ ^ _ r j _] n [n c i h [^ [j n [n c i h] n i n b _ n s j _ i ` m c g j f _ h i l g [n c p _ g i ^ _ f q _ b [p _ _ g j f i s ^ _ b _ l + C i l _ r [g j f _)] _ l n [c h _ r _ g j f [l * \ [m _ ^ g i ^ _ f m] [h \ _] i g j o n [n c i h [f f s _ k o c p [f _ h n n i n b _ n s j _ i ` ? [s _ m c [h c ` _ l _ h] _ g i ^ _ f q _ b [p _ j l _ m _ h n _ ^ b _ l _ % P b c] D l c ` c n b m] C _ f ^ g [h] \$ P [h \ i l h) / - . -8 m _ [f m i ^ c m] o m m c i h c h H f _ c h m] b g c ^ n \$ G [_ a _ l) / - .27 .50 * .51 & + P c g c f [l f s] q _ j l i d _] n n b [n _ l l i l * \ [m _ ^ c g j f c] c n f _ [l h c h a g i ^ _ f m j l _ ^ c] n [n f _ [m n k o [f c n [n c p _ f s m c g c f [l _ ` _] n m % @ b [h a _ n [f +] / - -38 A _ f f \$ @ b [h a] / - .08 ` i l ^ c m] o m m c i h) m _ [f m i G [_ a _ l \$ P h c ^ _ l) / - .0 & +

T _ q i o f ^ f c e _ n i] f i m _ \ s [] e h i q f ^ a c h a b i q b _ f j ` o f q _ b [p _ ` i o h ^ n b _ q e f f c h a h _ m m i ` E [l l c h a n i h P n [] e [h ^ b _ l] i f f _ [a o _ m n i m b [l _ c ^ _ m]] i g g _ h n) [h ^ n i [m e , [h m q _ l k o _ m n c i h m + Q b _ j l _ m _ h n l _ j f s _ f [\ i l [n _ m [h ^] f [l c ^ c _ m n b _ j l i j i m [f j o n ` i l q [l ^ c h C c h _ _ n [f + % / - .0 & + Q b c m q i o f ^ h i n b [p _ \ _ h j i m m c \ f _ q c n b i o n n b _ q i l e \ s E [l l c h a n i h P n [] e [h ^] i f f _ [a o _ m + L h [_ j _ l m i h [f h i n _) q _ b [p _ ` i o h ^ n b _ ^ c m] i o l m _ m o l l i o h ^ c h a n b c m l _ j f c] [n c i h { c h j [l n c] o f [l] q c n b E [l l c h a n i h P n [] e] G [g _ m] [h ^ T [n m i h { n i _ c h n _ f f _] n o [f f s l _ q [l ^ c h a] [h ^ b i j _ n b [n n b _ l _ m o f n m j l _ m _ h n _ ^ b _ l _] i h n l c \ o n _ n i ` o l n b _ l i o l o h ^ _ l m n [h ^ c h a i ` [^ [j n c p e n s ^ o l c h a f [h a o [a _ o h ^ _ l m n [h ^ c h a +

- AHKLTICBE JCKQP

T _ [l _ a l [n _ ` o f n i @ [i c g b _ E [l l c h a n i h P n [] e] > l c _ f G [g _ m] [h ^ A o [h _ T [n m i h ` i l l _ m j i h ^ c h a n i i o l k o _ l c _ m [\ i o n n b _ c l _ m _ h n _ h] _ g [n _ l c [f m] _ r] f o m c i h] l c n _ l c [] [h ^ [h [f s m _ m + T _ [j j l _] c [n _ n b [n E [l l c h a n i h P n [] e [h ^] i f f _ [a o _ m l _] b _ ^ i o n n i n b _ ` c l m n [o n b i l i ` n b _ i l c a c h [f m n o ^ s) > f _ r ? + C c h _) n i g [e _ m o l _ n b [n n b _ [h [f s m _ m n b _ s] i h ^ o] n _ ^ g e l l i l n b i m _] i h ^ o] n _ ^ c h n b _ i l c a c h [f j [j _ l] [h ^ n b [n E [l l c h a n i h P n [] e [h ^] i f f _ [a o _ m m b [l _ ^ l _ m o f n m [h ^ ^ [n [q c n b o m j l c i l n i j o \ f c] [n c i h + T _ n b [h e > f _ r ? + C c h _ ` i l j [n c _ h n f s [h m q _ l c h a k o _ m n c i h m [\ i o n n b _ i l c a c h [f m n o ^ s) ` i l m b [l c h a] i ^ _ [h ^ ^ [n [q c n b o m { [f f ^ _ m j c n _ b [p c h a f _ n [] [^ _ g c [+ T _ [f m i n b [h e > f _ r ? + C c h _ [h ^ n b _ g _ g _ l m i ` n b _ E o g [h I [h a o [a _ M l i] _ m m c h a I [\ { c h j [l n c] o f [l] P b [i l i h a V [h { ` i l c h m c a b n ` o f ^ c m] o m m c i h i ` _ [l f c _ l q l c n _ * o j m [h ^ j l _ m _ h n [n c i h m i ` n b _ q i l e m o g g [l c t _ ^ b _ l _ +

/ LKQOG@RQGLKP

- A QCG j l _ j [l _ ^ n b _ ^ [n [` l i g \ i n b m n o ^ c _ m ` i l [h [f s m c m q c n b b _ f j ` l i g > f _ r ? + C c h _) > l c _ f G [g _ m] [h ^ @ [i c g b _ E [l l c h a n i h P n [] e +
- A T ? c g j f _ g _ h n _ ^ n b _ _ n [* \ c h i g c [f _ f c _ * o j ^ [n c h a g i ^ _ f [h ^] l _ [n _ ^ [f f j l _ ^ c] n c i h a l [j b m q c n b c h j o n ` l i g QCG +
- A W ? ^ _ p _ f i j _ ^ [h ^ p [f c ^ [n _ ^ n b _ D > J J o m _ ^ n i] i l l _] n O Q m ` i l f c h _ [l _ ` _] n m i ` q i l ^ f _ h a n b [h ^ h i h * f c h _ [l _ ` _] n m i ` n l c [f j i m e n c i h] q c n b c h j o n ` l i g QCG [h ^ T ?

- A W?) qcnb chjon`li g QCG [h^ T?)]ih^o]n_^ j i q_l [h[fsm_m %hin l_j i l_n^ b_l_& nb[n]ih`cl g_^ nb[n fiahil g[f[h[fsm_m i`%]ill_]n_^ il oh]ill_]n_^& OQm b[p_bcab_l mn[nemnc][f j i q_l) nb[h mn[h^l^hil g[f[h[fsm_m+
- A QCG c g j f_g_hn^ [h^]ih^o]n_^ nb_ ?[s_mc[h l_j f c][ncih n_mmm+
- A QCG qlin_nb_j[j_l qcnb chjon`li g T? [h^ W?+ T? qlin_>jj_h^cr >+. qcnb chjon`li g QCG+
- A QCG) T?) [h^ W?]l_[n_^ [ff`caol_m [h^ n[\f_m+

: CDCOCKACP

>l[c] J+) \$ J[toe[] O+ %/- .0&+ Qb_ ^_p_fij g_hn i` G[j[h_m_ j[mmcp_ mshn[r [m ch^_r_^ \s mnlo]nol[f jlc gcha ch]i g j l_b_hmcih+ FaM^Q^Xe @[a^ZMX [R ;d\Q^UYQZ^MX E_eOT[X[Se) 0z5+ bnnj7,,^ic+ila,.-+.-5-, .414-/.5+/- .0+46-121

>l[c] J+) S[h Di g j_f) O+ M+ D+) \$ P]b__j_lm) @+ %/- -4&+ Mlc gcha ^cnl[hmcncp_ mnlo]nol_m ch]i g j l_b_hmcih+ 9[SZU^UbQ E_eOT[X[Se) -,) /.5z/2-+ bnnj7,,^ic+ila,.-+.-.3,d+]iajms]b+/- -3+-4+-- .

?[s_h) O+ E+) \$ Jcfch) M+ %/- .-&+ >h[fstcha O_]ncih Qc g_m+ ?Z^Q^ZM^U/[ZMX @[a^ZMX [R E_eOT[X[SUOMX GQ_QM^OT) +%/&) . /z/5+

?[n_m) A+) J[_]bf_l) J+) ?ife_l) ?+) \$ Pn_p_h T[fe_l+ %/- .2&+ fg_17 Ich_[l gcr_ ^*_`_]nm g i^_fm omcha Bca_h [h^ P1+ @[a^ZMX [R H^M^U^UOMX H[R^cM^Q) . /% .&+

?_lhif_n) P+) \$ E[lnmoce_l) O+ G+ %/- .-&+ Ai_m p_l _ \c[m g i^of[n_mshn[]nc] jlc gcha< 9[SZU^U[Z)),) 122z13.+ bnnj7,,^ic+ila,.-+.-.3,d+]iahencih+/- -6+..+--2

?c]eh_ff) H+) \$ I_ps) O+ %/- .-&+ Tbs l_[^_lm_lal_mn ni j_l_pciom qil^m7 > mn[nemnc][f[h[fsmcm+ Fh E^[/OQQPUZS_ [R `TQ ++^P 7ZZaMX BQQ^UZS [R `TQ 9[SZU^UbQ HOUQZOQ H[OUQ^e %jj+ 60. z603&+

?c]eh_ff) H+) Pf[nn_ls) Q+) O[sh_l) H+) Gibhmih) J+ A+ I+) @iaa[h) H+ >+) Pj_lf[tt[] G+ O+) y E_) @+ %/- .-&+ @ill_]ncih`il I_ps_n [f+] Bs_ g ip_g_hn_pc^_h]_ nb[n l_[^_lm g [chn[ch [h^ []n ih oh]_ln[chns [\ ion j[mn fchaocmc] chjon+ E^[/OQQPUZS_ [R `TQ CM^U/[ZMX 7OMPQYe [R HOUQZOQ_)) (/ % .&) 2/3- z2/3-+ bnnj7,,^ic+ila,.-+.-40,jh[m+ .- - .61. -4

?imih) J+ C+) E[f_] G+ Q+) Hfc_af) O+) M[nfc] R+) \$ S[mcmnb) P+ %/- .5&+ M[lmcha]immm [m j_l^_]nilm i` l_[^cha ^c`c]ofns7 >h_p[fo[ncih omcha nb_ Minm^[g P_hn_h]_ @iljom+ @[a^ZMX [R ;eQ B[bQYQZ^ GQ_QM^OT) *% .&) .z. /+

?ol]bfff) W+) ?ombiha) T+) \$ G[_a_l) Q+ C+ %/- .5&+ T[mn_^ j i q_l ch l_[^cha nc g_ [h[fsm_m % [h^ [mc g j f_ `cr&+

?ombiha) T+) ?ol]bfff) W+) \$ G[_a_l) Q+ C+ %h+^&+ ?[s_mc[h _fc_`*oj^ [ncha] [j nol_m mshn[]nc] [^ [jn[ncih ch a[l^_h j [nb_hpclih_g_hmm+ @b[ha) C+) A_ff) D+ P+) \$?i]e) G+ H+ %/- .3&+ ?_]i g cha mshn[]nc]+ E_eOT[X[SUOMX GQbUQc))) +%/&) /01z4/+ bnnj7,,^ic+ila,.-+.-04, - -00*/62U+. .0+ /+ /01

@b[ha) C+) G[h]c[ome[m] J+) \$ Ccnt) E+ %/- . /&+ I[hao[a_ [^ [jn[ncih [h^ f_[lhcha7 D_ncha _rjfc]cn [\ ion c g j f c]cn f_[lhcha+ AUZSaU^UO_ MZP AMZSaMSQ 9[Y\M_) .) /26z/45+ bnnj7,,^ic+ila,.-+.-. /,fh]0:004

@bi^li``) B+) Dif^_h) >+) \$ Tcfmih) @+ %/- .3&+ >h_gjclc][f[h^]i g jon[ncih[f mmo^s i` a_h_l[fct_ ^ [^ [jn[ncih ni h[nol[f n[fe_l^*mj_]c`c] SLQ+ Fh AMNET[Z+ @bi^li``) B+) \$ Tcfmih) @+ %/- .4&+ Pnlo]nol_ch n[fe_l^*mj_]c`c] jbih_nc] l_[fct[ncih7 @ip[lc[ncih i` mnij]ihmih[h n SLQ ch >g_lc][h Bhafcmb+ @[a^ZMX [R ET[ZQ^UO_) .)) 0-z14+ bnnj7,,^ic+ila,.-+.-.3,d+qi]h+/- .4+-+-- .

@bi^li``) B+) \$ Tcfmih) @+ %/- .5&+ Ml_^c]n[\cfens i` mnij]ihmih[h n jbih_nc]m []limm n[fe_lm7 ?_nq_h*][n_ails [h^ qcnbch*][n_ails ^_j_h^_h]c_m [giha]o_m `il jf[]_ [h^ pic]_+ AUZSaU^UO_ KMZSaM^P) , %m /&+ bnnj7,,^ic+ila,.-+.-2.2,fchap[h* / - .4* - -14

@l[s]l[n) K+ %/- .1&+ Acmnlc\oncih[f f_[lhcha ch l[jc^ mshn[]nc] [^ [jn[ncih+ @[a^ZMX [R JZPQ^S^MPaM^Q GQ_QM^OT) 01z1-+

Aj>aimnchi) O+ % .64- &+ Ql[hm`ilg[ncih ni Kilg[fens i` nb_ Koff Acmnlc\oncih i` a.+ 8U/[YQ^UWM) - /%0&) 346z35.+

A_ff) D+ P+) \$ @b[ha) C+ %/- .0&+ Qb_ M^*]b[ch7 l_f[ncha m_hn_h]_ jli^o]ncih [h^ cnm ^cmil^_lm ni]i g j l_b_hmcih [h^ []kocmcncih+

A_g_la) S+) \$ H_ff_l) C+ %/-5&+ A[n[`lig _s*_nl[]echa]iljil[[m _pc^h]_ `il nb_ilc_m i`
 mshn[]nc] jli]_mmcha jlgjf_rcns+ 9[SZU\U(Z))(I%/&) .60z/.-+
 bnnj7,,^ic+ila,.-+-.3,d+]iahencih+/-5+-4+--5
 Bfg[h] G+ I+ %.66-&+ Cch^cha Pnlo]nol_ ch Qc_g_+ 9[SZU`UbQ HOUQZOQ)),) .46z/...+
 Bfg[h] G+ I+) E[l_] J+) \$ J]O[_] H+ %.663&+ @o_m)]ihmnl[chnm] [h^]igj_nencih ch m_hn_h]_
 jli]_mmcha+ Fh J+ Qi g[m_ffi \$ A+ F+ Pfi \ch %B^m+&) 8Qe[ZP CM^a^Q&Ca^`a^Q2 ; _Me_ UZ >[Z/^
 [R ; XUfMNQ`T 8M`Q_ %jj+ ...z.20&+ Mms]bifias Ml_mm+
 C[lg_l) Q+ >+) Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-..&+ Fg jfc]cn @ihn_rn*Pj_]c`c] I_[lhcha I_ [^m ni
 O[jc^ Pbc`nm ch Pshn[]nc] Brj_]n[ncihm+ Fh I+ Fh @ [lfmih) @+ Ei_fm]b_l) \$ Q+ C+ Pbcjf_s %B^m+&)
 E^ [00QPUS_ [R `TQ ++^P 7ZZaMX BQQ`UZS [R `TQ 9[SZU`UbQ HOUQZOQ H[OUQ`e #9[SHOU))\$ %jj+
 /-22z/-3-&+ >omch) QU7 @iahencp_P]c_h]_ Pi]c_ns+
 C[lg_l) Q+ >+) Cch_) >+ ?+) V[h] P+) @b_cg [lcio) P+) \$ G[_a_l) Q+ C+ %/-..1&+ Bllil*Alcp_h >^[jn[ncih
 i` Ecab_l*I_p_f Brj_]n[ncihm Aolcha K[nol[f O_ [^cha+ Fh M+ Fh ?_ffi) J+ Do[lhc) J+
 J]Pb[h_] \$?+ P][mm_ff[nc %B^m+&)] E^ [00QPUS_ [R `TQ +. `T 7ZZaMX BQQ`UZS [R `TQ 9[SZU`UbQ
 HOUQZOQ H[OUQ`e %jj+ /.5.z/.53&+ >omch) QU7 @iahencp_P]c_h]_ Pi]c_ns+
 C_ll_cl[) C+) \$ @fc`nih) @+ G+ %.653&+ Qb_ Fh^_j_h^_h]_ i` Pshn[]nc] Mli]_mmcha) +.0) 015z035+
 C_ll_cl[) S+ P+ %/-0&+ Qb_ j_lmcmm_h]_ i` ijncih[f] jlgjf_g_hnct_l jli^o]ncih7 Tbs m[scha~|nb[n];
 cm hin m[scha~|nb[n]; [n [ff+ @ [a^ZMX [R BQY[^e MZP AMZSaMSQ) ,0) 046z065+
 Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-..&+ I[hao[a_]igjl_b_hmcih cm m_hmencp_ni]b[ha_m ch nb_
 l_fc[\cfns i` f_rc][f]o_m+ Fh I+ Fh @ [lfmih) @+ Ei_fm]b_l) \$ Q+ C+ Pbcjf_s %B^m+&)] E^ [00QPUS_
 [R `TQ ++^P 7ZZaMX BQQ`UZS [R `TQ 9[SZU`UbQ HOUQZOQ H[OUQ`e #9[SHOU))\$ %jj+ 6/2z60-&+
 >omch) QU7 @iahencp_P]c_h]_ Pi]c_ns+
 Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-..0&+ Bpc^h]_ `il Fg jfc]cn I_[lhcha ch Pshn[]nc] @igjl_b_hmcih+
 9[SZU`UbQ HOUQZOQ) +/%0&) 245z26+. bnnj7,,^ic+ila,.-+....,]iam+./-//
 Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-..3[&+ Qb_lif_ i` p_l\ l_j_ncncih ch]og of[nep_ mnlo]nol[f jlc gcha ch
]igjl_b_hmcih+ @ [a^ZMX [R ; d^Q^UYQZ`MX E_eOT[X[Se2 AQM^ZUZS% BQY[^e% MZP 9[SZU\U(Z)
 ,*%6&) .03/z.043+ bnnj7,,^ic+ila,.-+-.04,rfg----/03
 Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-..3[&+ Qb_Oif_ i` S_l\ O_j_ncncih ch @og of[nep_ Pnlo]nol[f Mlc gcha
 ch @igjl_b_hmcih+ @ [a^ZMX [R ; d^Q^UYQZ`MX E_eOT[X[Sej2 AQM^ZUZS% BQY[^e% MZP 9[SZU\U(Z)+
 bnnj7,,^ic+ila,bnnj7,,^r+^ic+ila,.-+-.04,rfg----/03
 Cch_) >+ ?+) G[_a_l) Q+ C+) C[lg_l) Q+ >+) \$ Nc[h] Q+ %/-..0&+ O[jc^ _rj_]n[ncih [^jn[ncih ^olcha
 mshn[]nc] jlgjl_b_hmcih+ EX/H DC;) 0%.-&) _4433.+
 bnnj7,,^ic+ila,.-+.04,.diolh[f:jih+--4433.
 Cch_) >+ ?+) Nc[h] Q+) G[_a_l) Q+ C+) \$ G[]i\m) O+ >+ %/-..&+ Fm nb_l_ mshn[]nc] [^jn[ncih ch f[hao[a_
]igjl_b_hmcih< Fh G+ Q+ E[f_ %B^+&)] E^ [00QPUS_ [R 79A2 L[^W_T[\ [Z 9[SZU`UbQ B[PQXUZS
 MZP 9[Y^a^M^U[ZMX AUZSaU_`UO_ %jj+ .5z/3&+ Pnio^m\ola) M>7 >mmi]c[ncih `il @igjon[ncih[f
 Ichaocmnc]m+
 Cch_a[h] B+) \$?c_l) A+ %/-..&+ O_acmn_l p[lc[ncih [h^ mi]c[f ^c[f_]n p[lc[ncih7 Qb_l_acmn_l [rci g+
 Cl[he] P+ I+) \$?i^) O+ %/-..&+ Fhm_hmencpens i` nb_ bog[h_m_hn_h]_*jli]_mmcha msmn_g ni
 bc_l[l]bc][f mnlo]nol+ E_eOT[X[SUOMX HOUQZOQ) **%3&) 5/6z501+
 bnnj7,,^ic+ila,.-+.44,-6234643..1-6256
 Cl[oh^il`) P+ E+) \$ G[_a_l) Q+ C+ %/-..3&+ O_ [^lm a_h_l[fct_ [^jn[ncih ni h_qfs*_h]iohn_l_ ^
 ^c[f_]n[f mnlo]nol_m ni inb_l oh` [g cfc[l mnlo]nol_m k+ @ [a^ZMX [R BQY[^e MZP AMZSaMSQ) I))
 /5z25+ bnnj7,,^ic+ila,.-+-.3,d+dg f+/-..3+-2+--3
 D[lhm_s) P+ J+) M_[lfgonn_l) K+ G+) J s_lm) B+) \$ I ini]es) J+ [+ %.664&+ Qb_ @ihnl\oncihm i` S_l\
 ?c[m [h^ Mf[omc\cfns ni nb_ @igjl_b_hmcih i` Q_g jil[lcfs >g\cao iom P_hn_h]_m+ @ [a^ZMX
 [R BQY[^e MZP AMZSaMSQ) +/%&) 25z60+ bnnj7,,^ic+ila,.-+-.3,dg f+/.664+/2./
 D[lli^) P+) \$ Mc[e_lcha) J+ G+ %/-..6&+ Gichn >]ncih) Fhn_l[]nep_ >fcahg_hn) [h^ Ac[fi a+ I/\UO_ UZ
 9[SZU`UbQ HOUQZOQ))%/&) /6/z0-1+ bnnj7,,^ic+ila,.-+....,d+.423*5432+/--6+-.-/-+r
 Dlc`cnbm) Q+ I+) @b[n_l) K+) H_g j) @+) M_l`il m) >+) \$ Q_h_h\ [og) G+ ?+ %/-..&+ Mli\ [cfemnc] g i^ fm
 i`]iahencih7_rjfilcha l_jl_m_hn[ncihm [h^ ch^o]ncp_ \c[m_m+ I^QZP_ UZ 9[SZU`UbQ HOUQZOQ_)
),%5&) 024z31+ bnnj7,,^ic+ila,.-+-.3,d+nc]m+/-..-+-2+--1
 E[f_] G+ Q+ %/-..&+ > Mli\ [cfemnc] B[lf_s M[lm_l [m [Mms]bifchaocmnc] J i^_f+ Fh C779A i()

E^[000PUZS_ [R `TQ_Q0[ZP YQQ`UZS [R `TQ C[^T 7YQ^UOMZ 9TM\`Q^ [R `TQ 7__[OUM^U/Z R[^
9[Y\`a^M^U[ZMX AUZSaU_`UO_ [Z AMZSaMSQ_Q0TZ[X/SUQ_ %jj+.z5&+
E[1_) J+) Q[h_hb[om) J+ H+) \$ J]O[_] H+ %/-4&+ Rh^_lmm[h^cha [h^ jli^o]cha nb_1^o]_ ^
l_f[nep_]ihmnl[ncih7 Bpc^_h]_ `li g l[ncham] _^cncha [h^]iljil[+ @[a^ZMX [R BQY[^e MZP
AMZSaMSQ) -. %0&) 1.-z102+ bnnj7,,^ic+ila,.-+-.3,d+dgf+/-3+-5+--4
E[llchanih Pn[e) @+ J+) G[g_m] >+ K+) \$ T[nmih] A+ D+ %/-5&+ `cfol_ni l_jfc][n_l[jc^ mshn[]nc]
[^[jn[ncih ch]i g j l_b_hmcih+ BQY[^e " 9[SZU^U/Z) ,. %3&) 531z544+
G[_a_l) Q+ C+) \$ Phc^_l) K+ %/-5&+ Fg jfc]cn f_[lhcha [h^ mshn[]nc] j_lmmcn_h]_7 Poljlc[m[f [h^
@ogof[nepcnst+ Fh ?+ @+ Iip_) H+ J]O[_] \$ S+ J+ Pfionmes %B^m+&) *E*^[000PUZS_ [R `TQ +(^T
7ZZaMX BQQ^UZS [R `TQ 9[SZU^UbQ HOUQZOQ H[OUQ`e #9[SHOU(0\$ %jj+ .-3.z.-33&+ >omnch) QU7
@iahcnep_P]c_h]_ Pi]c_ns+
G[_a_l) Q+ C+) \$ Phc^_l) K+ B+ %/-0&+ >fcagh_hn [m []ihm_ko_h]_ i`_rj_]n[ncih [^jn[ncih7
Pshn[]nc] jlcgcha cm [``_]n_ ^ \s nb_ jlcg_]m j_l^c]ncih_llil acp_h \inb jlcil [h^ l_]_hn
_rj_lc_h]_+ 9[SZU^U/Z))*/%&) 24z50+ bnnj7,,^ic+ila,.-+-.3,d+]iahcnch+/-./+.-+-.0
H[g_c^_) V+ %/-./&+ I_[lhcha ch^cpc^o[f n[fe_lm] mnl]nol[f j l_`l_h]_m+ 9[SZU^U/Z))*,%&) 33z4.+
bnnj7,,^ic+ila,.-+-.3,d+]iahcnch+/-./+.-+-.0
H[m]b[e) J+ M+ %/-3&+ Tb[n nbcm]ihmnl[ncih h__^m cm a_h_l[fc_t^+ BQY[^e " 9[SZU^U/Z) +, %/&)
035z046+ bnnj7,,^ic+ila,.-+0425,?C-0.601.1
H[m]b[e) J+ M+) \$ Df_h[_la] >+ J+ %/-1&+ Qbcm]ihmnl[ncih h__^m f_[lh_+ @[^a^ZMX [R
;d\Q^UYQZ^MX E_eOT[X/Se' =QZQ^MX))++0&) 12-z34+ bnnj7,,^ic+ila,.-+-.04,--63*
0112+.00+0+12-
H[mm) O+ B+) \$ O[_n_ls] >+ B+ %.662&+ ?[s_m C[]nilm+ @[a^ZMX [R `TQ 7YQ^UOMZ H^M^U_`UOMX
7__[OUM^U/ZU) I(%10-&) 440z462+
Hf_chm]b g c^_n) A+ C+) Cch_) >+ ?+) \$ G[_a_l) Q+ C+ %/-./&+ > _fc_`*oj^[ncha g i^f i` [^[jn[ncih [h^
]o_]i g \ch[ncih ch mshn[]nc]]i g j l_b_hmcih+ Fh *E*^[000PUZS_ [R `TQ +, ^T 7ZZaMX BQQ^UZS [R
`TQ 9[SZU^UbQ HOUQZOQ H[OUQ`e #9[SHOU)*\$ %jj+ 266z3-1&+ >omnch) QU7 @iahcnep_P]c_h]_
Pi]c_ns+
Hf_chm]b g c^_n) A+ C+) \$ G[_a_l) Q+ C+ %/-2&+ Oi\omn mj_]b j_l]_jncih7 O_]iahct_nb_ `[gfcf[l)
a_h_l[fc_t_ni nb_ mcgcf[l) [h^ [^[jn ni nb_ hip_f+ E_eOT[X/SUOMX GQbUQc))**%&) .15z/-0+
bnnj7,,^ic+ila,.-+-.04,[-05362
Hfc_af) O+) J [mmih] J+ B+ G+) \$ Oc]bn_l) B+ J+ %/-.-&+ > fch_[l gcr_ ^ g i^f [h[fsmcm i` g [me^
l_j_nncih jlcgcha+ KU_aMX 9[SZU^U/Z))0%2&) 322z35.+
bnnj7,,^ic+ila,.-+-.5-,02-3/5-6-/653-25
Hoeih[) >+) @bi) M+ T+) J [ahomih] G+ P+) \$ Q[\il) T+ %/-1&+ I_rc][f chn_l`l_h]_ ``_]nm ch
m_hn_h]_ jli_]mmcha7 Bpc^_h]_ `li g nb_ pemo[f qilf^ j[l[^cag [h^ m_f^*ila[hctcha g i^fm+
@[a^ZMX [R ;d\Q^UYQZ^MX E_eOT[X/Se' AQM^UZS% BQY[^e% MZP 9[SZU^U/Z) ,() 0/3z14+
bnnj7,,^ic+ila,.-+-.04,[-016-0
Hoj_l\la) D+ O+) \$ G[_a_l) Q+ C+ %/-3&+ Tb[n ^i q_ g_[h \s j_l^c]ncih ch f[hao[a_]
]i g j l_b_hmcih< AMZSaMSQ 9[SZU^U/Z " CQa^[_OUQZOQ))%&) 0/z26+
bnnj7,,^ic+ila,.-+-.5-,0/40465+/-2+...//66
Hoj_lg[h) S+) A[g\[]b_l) J+) Konbg[h] >+) Hfc_af) O+) Hoj_lg[h) S+) A[g\[]b_l) J+) y
Hoj_lg[h) S+ %/-.-&+ Qb_ ``_]n i` qil^ jimcnch ih_s_*gip_g_hnm ch m_hn_h]_ [h^
j[l[al[jb_l[^cha Qb_ ``_]n i` qil^ jimcnch ih_s_*gip_g_hnm ch m_hn_h]_ [h^ j[l[al[jb
l[^cha) (*)0+ bnnj7,,^ic+ila,.-+-.5-,414-/...-03-/1./
Hoth_nmp[) >+) ?li]ebi``) M+ ?+) \$ @blcmn_hm_h) O+ E+ ?+ %/-4&+ IJ C0<CPQ M[]e[a_7 Q_mnm ch
Ich_[l Jcr_ ^ B``_]nm J i^fm+ @[a^ZMX [R H^M^U_`UOMX H[R^cM^Q) 0**%.0&+
bnnj7,,^ic+ila,.-+5304,dmm+p-5/+c.0
I_ps) O+ %/-5&+ Brj_]n[ncih*[m_ ^ mshn[]nc]]i g j l_b_hmcih+ 9[SZU^U/Z))(. %0&) ../3z44+
bnnj7,,^ic+ila,.-+-.3,d+]iahcnch+/-4+-2+--3
I_ps) O+ %/-...&+ Fhn_al[ncha moljlc[m[f [h^ oh]_ln[ch*chjon g i^fm ch ihfch_m_hn_h]_
]i g j l_b_hmcih`ilg[f n_]bhcko_m [h^ _g jclc][f l_mofnm+ Fh *E*^[000PUZS_ [R `TQ ,I^T 7ZZaMX
BQQ^UZS [R `TQ 7__[OUM^U/Z R[^ 9[Y\`a^M^U[ZMX AUZSaU_`UO_ %jj+.z...&+
Icht_h) Q+) \$ G[_a_l) Q+ C+ %/-2&+ Rh]_ln[chns [h^ Brj_]n[ncih ch P_hn_h]_ Mli_]mmcha7 Bpc^_h]_

Clig Po\)[n_ailt[ncih Acmlc\oncihm+ 9[*SZU`UbQ HOUQZOQ`* bnnj7,,^ic+ila,.-+....,]iam+.//41
 Ico) I+) ?ol]bfff) W+) Q[h_hb[om) J+ H+) \$ G[_a_l) Q+ C+ %/- .4&+ C[cfol_ni l_jfc][n_n[fe_l*mj_]c`c]
 mshn[]nc) [^j[n[ncih+ Fh *E^[OQQPUZS_ /R 9[SHOU+*
 J []Aih[f^) J+ @+ % .666&+ Acmlc\oncih[f ch`ilg [ncih ch f[hao[a_] i g j l_b_hmcih) jli^o)ncih) [h^
 []kocmcncih7 Qbl__ jottf_m [h^ [g il[f+ Fh ?+ J []Tbchh_s %B^+&) *ITQ ;YQ^SQZOQ /R*
AMZSaMSQ %jj+ .44z.63&+
 J []Aih[f^) J+ @+ %/- .0&+ Ei q f[hao[a_] jli^o)ncih mb[j_m f[hao[a_] ilg [h^] i g j l_b_hmcih+
 <^/Z`UQ^_UZ *E_eOT[X[Se) ,%/ /3& .z.3+ bnnj7,,^ic+ila,.-+0056,`jmsa+/- .0+-- /3*
 J []Aih[f^) J+ @+) Gomm) J+ >+) \$ @[lj_hn_l) M+ >+ % .66/ &+ Tilecha g_gils]ihmnl[chnm ih nb_
 jli]_mmcha i` mshn[]nc) [g \caocns+ 9[*SZU`UbQ E_eOT[X[Se) *,% .&) 23z65+*
 J []Aih[f^) J+ @+) M_[lfgonn_l) K+ G+) \$ P_c^h_la) J+ P+ % .661&+ Qb_f_rc][f h[nol_i` mshn[]nc]
 [g \caocns l_mifoncih+ *E_eOT[X[SUMX GQbUQc))()%1&) 343z4-0+ bnnj7,,^ic+ila,.-+ .-04,--00**
/62U+ .- .1+343
 J [mm[li) A+ T+) \$ Clc^g[h) A+ % .66-&+ Ji^_fm i` chn_al[ncih acp_h gofncjf_miol]_m i`
 ch`ilg [ncih+ *E_eOT[X[SUMX GQbUQc) 1/%&) //2z/2/+ bnnj7,,^ic+ila,.-+ .-04,--00**
/62U+64+ /+ /2
 J []Aih[f^) P+ >+) \$ Pbcff[i]e) O+ @+ %/- .0&+ Iiq`f_p_f j l^c]ncp_ ch`_l_h]_ ch l[_^cha7 nb_
 ch`fo_h]_ i` nl[hmcncih[f jli\[\cfnc_m ih _s_ g ip_g_hnm+ *KU_U[Z GQ_QM^OT) ,+%.3&) .402z*
*.42. + bnnj7,,^ic+ila,.-+ .- .3,P- -1/*3656%-0&-- /04*/*
 J [O[_) H+) Pjcp_s*Hhiqfni) J+ G+) \$ Q[h_hb[om) J+ H+ % .665&+ Ji^_fcha nb_ Fh`fo_h]_ i`
 Qb_g[nc] Ccn % [h^ Lnb_l @ihmnl[chnm& ch Lh*fch_ P_hn_h]_ @i g j l_b_hmcih+ @/a^ZMX /R
BQY[^e MZP AMZSaMSQ) +0) /50z0. /+
 J smfwh) J+) \$ I_ps) O+ %/- .3&+ @i g j l_b_hmcih jlcgcha [m l[ncih[f _rj_]n[ncih`il l_j_ncncih7
 Bpc^_h]_ `li g mshn[]nc) jli]_mmcha)), /) /6z23+
 bnnj7,,^ic+ila,.-+ .- .3,d+]iahcncih+/- .2+ .-+ / .
 K[l[s[h(h) P+) \$ Gol[mes) A+ %/- .1&+ > ?[s_mc[h Ji^_f i` Eog[h P_hn_h]_ Mli]_mmcha+ Fh
E^[OQQPUZS_ /R `TQ `cQXR`T MZZaMX YQQ`UZS /R `TQ O[SZU`UbQ_OUQZOQ_[OUQ`e %jj+ .z22&+
 Kc[_h`icg) ?+) Iia[_p) M+) D[nn_c) @+) \$ S[mcmnb) P+ %/- .3&+ Tb_h beab*][j[]cns l[_^_lm mfi q
 ^i qh [h^ fi q*][j[]cns l[_^_lm mj_ ^oj7 Tilecha g_gils [h^ fi][fcns ``_]nm+ <^/Z`UQ^_UZ
E_eOT[X[Se) /% J >O&+ bnnj7,,^ic+ila,.-+0056,`jmsa+/- .3+-- /5-
 Mc[e_lcha) J+ G+) J [I_[h) G+ C+) \$?l[hca[h) E+ M+ %/- .0&+ M_lmcmn_hn mnlo]nol[f jlcgcha [h^
 `l_ko_h]s ``_]nm ^olcha]i g j l_b_hmcih+ @/a^ZMX /R ;d\Q^UYQZ`MX *E_eOT[X[Se2 AQM^ZUZS*
BQY[^e MZP 9[SZU`U(Z) +I%O&) 56-z564+ bnnj7,,^ic+ila,.-+ .-04,[- - /6.5.
 Nc[h) Q+) G[_a_l) Q+ C+) \$ >mfeh) O+ K+ %/- . /&+ I_[lhcha ni O_jl_m_hn [J ofnc*@ihn_rn Bhpclih_g_hn7
 J il_ nb[h A_n_]ncha @b[ha_m+ <^/Z`UQ^_UZ *E_eOT[X[Se) +%Gofs&) //5+*
 bnnj7,,^ic+ila,.-+0056,`jmsa+/- . /+-- /5
 O @il_Q[g+ %/- .4&+ G2 7 AMZSaMSQ MZP ;ZbU^[ZYQZ`R[^H`M`U`UOMX 9[Y\`a`UZS+ Sc_hh[]>omlc[+
 O[n_ls) >+ B+ % .662&+ ?[s_mc[h gi^_f_m_f_]ncih ch mi]c[f l_m_[l]b+ *H[OU[X[SUMX BQ`T[P[X[Se) *-)*
...z.30+
 O_cnn_l) A+) H_ff_l) C+) \$ J iil_) G+ A+ %/- .&+ >]i g jon[ncih[f]iahcncp_ gi^_f i` mshn[]nc]
 jlcgcha+ 9[*SZU`UbQ HOUQZOQ) +-%1&) 254z304+ bnnj7,,^ic+ila,.-+....,d+.22.**
34-6+/- .-+ .- .32+r
 Oif[h^) A+) Ac[e) C+) \$ Bfg[h) G+ I+ %/- .4&+ Cl_ko_h]s i` ?[mc] Bhafcmb Dl[g g[nc][f Pnlo]nol_m7
 > @iljom >h[fsmcn+ @/a^ZMX /R *BQY[^e MZP AMZSaMSQ) -/%0&) 015z046+*
 bnnj7,,^ic+ila,.-+ .- .3,d+d g f+/- .4+ -0+-- /
 Oio^_l) G+ K+ %/- .2&+ >l_ ohmbc`n^ ^cmnlc\oncih[f gi^_fm [jjlijlc[n_ `il l_mjihm_ ncg<
E_eOT[YQ^UWM) /(%&) 044z05.+ bnnj7,,^ic+ila,.-+ .- .4,m..003- -2*./64*4*
 Oio^_l) G+ K+) Io) G+) Pj_]eg[h) M+) Poh) A+) \$ Gc[ha) V+ %/- .2&+ > bc_l[l]bc][f gi^_f`il
 _mncg[ncha l_mjihm_ ncg_ ^cmnlc\oncihm+ *E_eOT[Z[YUO 8aXXQ`UZ " GQbUQc))*%/&) .62z/0+*
 bnnj7,,^ic+ila,.-+0425,?C-0/24/2/
 Osmech) O+ >+) Nc) W+) Ao`) J+ @+) \$?liqh*P]bgc^_n) P+ %/- .4&+ S_l\ \c[m_m [l_ mb[j_ ^ nblioab
 fc`fiha f_[lhcha+ @/a^ZMX /R ;d\Q^UYQZ`MX *E_eOT[X[Se2 AQM^ZUZS BQY[^e MZP 9[SZU`U(Z)*
 ,+%2&) 45.z461+ bnnj7,,^ic+ila,.-+ .-04,rfg ---01.

Pbc) I+) Dlc`cnbm) Q+ I+) C_f^g[h] K+ E+) \$ P[h\ilh) >+ K+ %/-.-&+ Br_gjfl[g i^_fm [m [g_]b[hcm g`il j_l`ilgcha ?[s_mc[h ch`_l_h]_+ E_eOT[Z[YUO 8aXXQ`UZ " GQbUQc))/%1&) 110z 31+ bnnj7,,^ic+ila,..+0425,M?O+.4+1+110

Pgcnb) K+ G+) \$ I_ps) O+ %/-.-0&+ Qb_``_n i` qil^ j_l^c)n[cfens ih l_^[cha nc g_ cm fia[lcnbgc]+ 9[SZU`U/Z)) *0%0&) 0- /z.6+ bnnj7,,^ic+ila,..+.-.3,d+]iahcncih+/-.-0+/-+.-.0

Q[\il) T+) \$ Q[h_hb[om) J+ H+ %.666&+ Ash[gc][f J i^_fm i` P_hn_h]_ Mli]_mmcha+ 9[SZU`UbQ HOUQZOQ) *+%1&) 16.z2.2+ bnnj7,,^ic+ila,..+/-.-4,m.22.34-6]ia/0-1Z2

Q[\immc) M+) Pjcp_s^Hhi qfnih) J+ G+) J JO[_] H+) \$ Q[h_hb[om) J+ H+ %.661&+ P_g[hnc]_``_nm ih mshn[]nc] [g\caocns l_mifoncih7 Bpc^_h]_`il []ihmnl[chn*\[m^_l_mifoncih jli]_mm+ Qbinb[nblc) J+) \$ Ph^_e_l) G+ %/-.-5&+ Dcp_[h^ n[e_7 mshn[]nc] jlcgcha ^olcha mjie_hf[haof[a_ jlgjl_b_hmcih+ 9[SZU`U/Z))(0%.&) 2.z35+ bnnj7,,^ic+ila,..+.-.3,d+]iahcncih+/-.-4+/-+.-. / Qi i_s) H+ J+) Pq[([) Q+ V+) ?io^_qsh) J+ [+ Wclhmn_ch) J+) \$ Ql[rf_l) J+ G+ %/-.-0&+ Bpc^_h]_`il jlcgcha []limm chn_lp_hcha m_hn_h]_m ^olcha ih*fch_m_hn_h]_ jlgjl_b_hmcih+ AMZSaMSQ% 9[SZU`U/Z MZP CQa^[_OUQZOQ) *I%0&) /56z0..+ bnnj7,,^ic+ila,..+.-.5,-.36-632+/-.-0+44-56/ Ql[rf_l) J+ G+ %/-.-5&+ I_rc][ffs ch^_j_h^_hn jlcgcha ch ihfch_m_hn_h]_ jlgjl_b_hmcih+ E_eOT[Z[YUO 8aXXQ`UZ " GQbUQc))-%.&) .16z.22+ bnnj7,,^ic+ila,..+0425,M?O+.2+ .+16

Qlo_m_q_ff) G+ @+) Q[h_hb[om) J+ H+) \$ D[lhm_s) P+ J+ %.661&+ P_g[hnc] Fh`fo_h]_m ih M[lmcha7 Rm_ i` Qb_g[nc] Oif_ Fh`ilg[ncih ch Pshn[]nc] >g\caocns O_mifoncih+ @[a^ZMX [R BQY[^e MZP AMZSaMSQ) ++)/52z0.5+

S[mcmbnb) P+) \$ D_fg[h] >+ %/-.-4&+ Qb_mn[nemnc][f meahc`c][h]_`cf_n_l f_^[^m ni ip_l]ih`c^_hn _rj_]n[ncihm i` l_jfc][cfens))(+%Gofs&) .2.z.42+ bnnj7,,^ic+ila,..+.-.43-2,LPC+FL,E?N@T S_lb[a_h) G+) \$ T[a_hg[e_lm) B+ G+ %/-.-1&+ ?[s_mc[h n_mmm ni ko[hnc`s nb_l_mofn i` [l_jfc][ncih [nm_g_jn+ @[a^ZMX [R ;d\Q^U YQZ^MX E_eOT[X/Se2 =QZQ^MX)),+%1&) .124z.142+ bnnj7,,^ic+ila,..+.-.04,[-.-0340.

T[a_hg[e_lm) B+ G+ %/-.-4&+ > jll[]nc][f mifoncih ni nb_j_lp[mcp_ jli\ f_gm i` j p[fo_m+ E_eOT[Z[YUO 8aXXQ`UZ " GQbUQc)),%2&) 446z5-1+

T[a_hg[e_lm) B+ G+) \$?liqh) P+ %/-.-4&+ Lh nb_ Ich_[l O_f[ncih ?_nq_h nb_ J_[h [h^ nb_ Pn[h^ [l^ A_pc[ncih i` [O_mjihm_ Qcg_ Acmmle\oncih+ E_eOT[X/SUOMX GQbUQc))),%0&) 50-z 51.+ bnnj7,,^ic+ila,..+.-.04,[-.-00*/62U+. .1+0+50-

T_ch_l) B+ G+) \$ I[\ip) T+ %.650&+ @ihmnl[chnm ih nb_ [a_hnf_mm j[mmcp_+ @[a^ZMX [R AUZSaU_`UO_))I%-.&) /6+ bnnj7,,^ic+ila,..+.-.4,P- - - - /34- - - - 411.

T_ffm) G+ ?+) @blcmnc[hm_h) J+ E+) O[]_ A+ P+) >[b_mih) A+ G+) \$ J[]Aih[f^) J+ @+ %/-.-6&+ Brj_lc_h]_ [h^ m_hn_h]_ jli]_mmcha7 Pn[nemnc][f f_[lhcha [h^ l_f[nep_]f[om_]lgjl_b_hmcih+ 9[SZU`UbQ E_eOT[X/Se) -0) /2-z/4.+ bnnj7,,^ic+ila,..+.-.3,d+]iajms]b+/-.-5+5+ - - / Tcfmih) J+ M+) \$ D[lhm_s) P+ J+ %/-.-6&+ J [echa mcg jf_m_hn_h]_m b[l^7 S_l\ \c[m_``_nm ch mcg jf_ ^cl_]n i\d_]n m_hn_h]_m+ @[a^ZMX [R BQY[^e MZP AMZSaMSQ) .(%0&) 035z06/+ bnnj7,,^ic+ila,..+.-.3,d+dgf+/-.-5+6+ - - 2

Tii^) P+ K+ %/-.-3&+ ga]p7 D> J m qcnb D@S,>F@,OB J I m g i inbh_mm_mncg[ncih [h^ D> J J m \s MNI+ G EMOWMSQ KQ^_U/Z) '0&).'

Tii^) P+ K+ %/-.-4&+ =QZQ^MXUfQP MPPU`UbQ Y[PQX_2 MZ UZ^ [Pa0`U/Z cU`T G+ @b[j g[h [h^ E[ff+ V[h) P+ C[l_g_l) Q+) \$ G[_a_l) Q+ C+ %/-.-5&+ >^[jn[ncih i` mshn[]nc] _rj_]n[ncihm [``_]nm l_*[h[fsmcn l[nb_l nb[h chenc[f molj lcm[f+

- MMCKB6U -

1UMCAQ?QGLK ?B?MQ?QGLK ?P . ?VCPG?K @CIGCD\$RMB?QCKE

>jj_h^cr >+. j1_m_hnm nb_ _fc_oj^[ncha gi^f_ >jj_h^cr >+/ mog g [lct_m nb_ j1^c]ncihm i`nbcm gi^f_il\fi]e*f_p_f[h[fsm_mfce_nbim_]ih^o]n^ch nb_ ilcach[fmmo^s \s Cch_ _n [f+ %/- .0& [h^ nb_ l_jfc][ncih \s E[llchanih Pn[e _n [f+ %/- .5&+ Fh nb_ g[ch n_rn] q_ j1_m_hn nlc[f*f_p_f[h[fsm_mchmn_]^(m nb_s g[e_nb_fche _nq_h nb_ _fc_oj^[ncha gi^f_ [h^ j1^c]n^]b[ha_m ch moljlc[m[f gil_nl[hmj[l_hn+

- '% <FC @CIGCD\$RMB?QCKE J LBCI

Qb_ _n[*\chigc[f _fc_oj^[ncha gi^f_ j1_m_hn^ ch Cch_ _n [f+ %/- .-& mn[lm `lig nb_ [mmo gjncih nb[n]ig j1_b_h^_lm b[p_ jlcil_rj_]n[ncihm [\ion nb_ jli\[\cfns i`nqi [fn_lh[ncp_mshn[]nc] mmo]nol_m); X5 7YS @ [h^; X6 2YS (R @ @ig j1_b_h^_lm [l_n[e_h ni b[p_mig_ ^_al_ i` aZ0Q^MUZe [\ion \$+ Qbcm oh]_ln[chns ip_l_rj_]n[ncihm cm l_j1_m_hn^ \s nb_ _n[^cmnlc\oncih qcnb j[l[g_n_lm x [h^ ¥ %b_l_) l_j1_m_hncha J Sm [h^ O@m&+ Fh nocp_fs) nb_m_ j[l[g_n_lm] [h _ nbioabn i` [m jm_odocounts of the number of times the comprehender has encountered each structure. As the sum of and ! gets larger, the uncertainty about ; X5 7Y and ; X6 2Y decreases—the beta distribution gets tighter and more peaked. Examples of the beta distribution and changes in that distribution are shown in Panel B of Ccaol_ 1 in the main text.

Rh^_l nb_ [mmo gjncih i` [_n[]ihdoa[n_ jlcil) nb_ l_mofncha oh]_ln[chns ip_l; X5 7Y at each point in the experiment is described as a function of and !:

$$; X@YS \ 1: <9X@# = Z>Y. \ @^{OJ} E X(R @Y^{PJ} E$$

where both parameters can be understood as the sum of the *prior* pseudo counts for the respective structure (. and !.) and the number of observations of that structure within the experiment so far. Cil_r[gjf_) `il []ig j1_b_h^_l qbi b[m_h]iohn_l^ 0 J Sm [h^ .- O@m mi ` [l) nb_ jimm_lcil _fc_m [\ion @ [l_7

$$; X@#O@YS \ 1: <9X@# = Q) Z> Q (' Y. \ @^{OI} F X(R @Y^{PI} H$$

Fh mbiln) _[]b neg_ []ig j1_b_h^_l _h]iohn_lm [mmo]nol_) nb_s oj^[n_nb[n mmo]nol_]m jm_o^i]iohn+ Qbcm jimm_lcil nb_h _]ig_m nb_ jlcil `il nb_h_rn nlc[f []ig j1_b_h^_l _h]iohn_lm [l_f_p[hn mmo]nol_+

Qi [jjlireg[n_ _fc_m [\ion [ff inb_l mmo]nol_m nb[n] [h i]]ol ch nb_ m[g_ [g\caoiom _hpclihg_hmm [m J Sm [h^ O@m] q_ gi^c`s nb_ _n[^cmnlc\oncih \s chnli^o]cha [nbel^ j[l[g_n_l !+ Pch]_]ig j1_b_h^_lm h_p_l _h]iohn_l]lcnc][f_m_hn_h]_m ch [hs mmo]nol_ inb_l nb[h O@ [h^ J S) nbcm j[l[g_n_l h_p_l]b[ha_m nblioabion nb_]iolm i` nb_ _rj_lcg_hn+ We obtain expectations for ; X5 7Y and ; X6 2Y by marginaltcha ip_l nb_ _n[^cmnlc\oncih) acpcha om7

$$; X5 \ 7YS \ =V_{=Q > Q ?) [h^; X6 \ 2YS \ >V_{=Q > Q ?$$

To further reduce the degrees of freedom of this model, we hold the relative proportion of \$_D, %_D, and ?_D constant at -+- -5) [h^ -+0//) l_mj_]ncp_fs (based on the relative frequency of MV and RC continuations in the ambiguous context in large databases of English, Roland et al., 2007). This allows us to have only a single degree of freedom, &S \$_D Q %_D Q ?_D.

- %(. ILAHSICSCI MOCBGAQGLKP QF?Q ALOOCAQ DLO QFC BDDCOCKACP GK BCPGEK

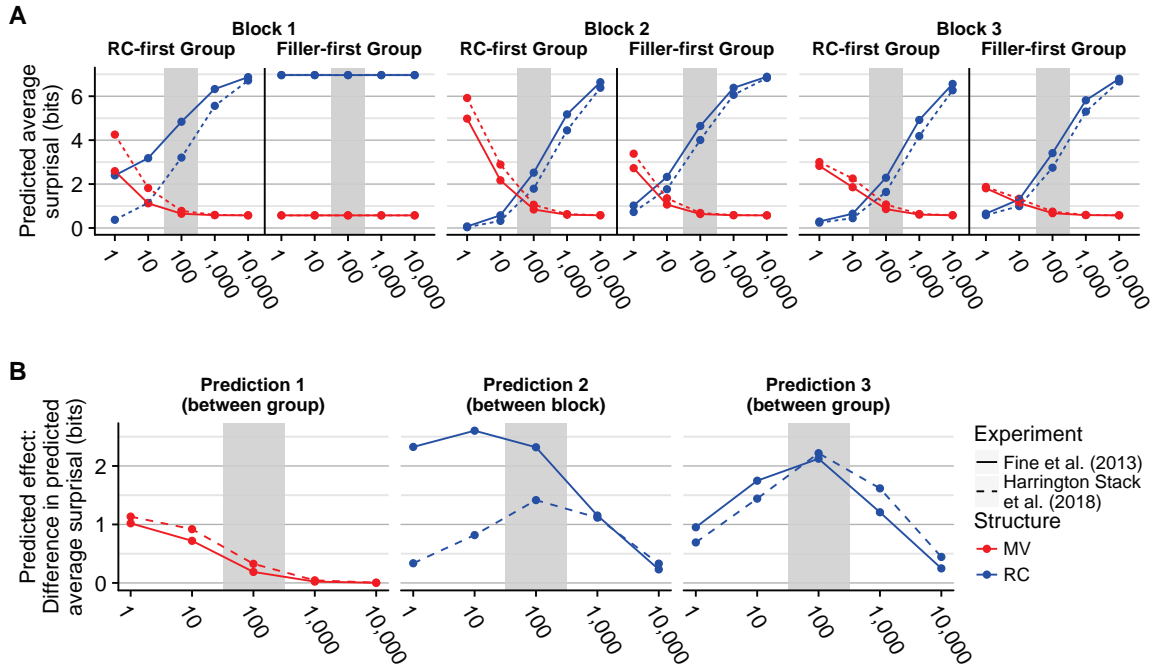
T_] [h om_ nb_ _fc_oj^[ncha gi^f_ ni] [f] of[n_nb_ [p_l[a_ O@ [h^ J S moljlc[m[f `il nb_ nbl_ \fi]em i` C.0; m [h^ EP.5; m ^_mcahm \s [aal_a[ncha ip_l nlc[f*f_p_f j1^c]ncihm %nbim_mbiqh

ch Ccaol_ /)+ Clig nbcm) q_ nb_h][f]of[n_ nb_ j_l^c]n_ ^ ^c`_l_h]_m ch moljlc[m[f l_f_p[h n ni
 ML_ ^c]ncihm . *0`il_][b i` nb_ nqi ^_mcahm+

M[h_f > i` Ccaol_ .0mbiqmnb_ j_l^c]n_ ^ g_[h moljlc[m[f`il [ffnbl_ \fi]em i` \inb nb_ ilcach[f
 C.0) [h^ nb_ l_pcm_ ^ EP.5) ^_mcah+ @ihmc^_l) `il_r[g jf_) nb_ hog _l i` O@m ch ?fi]e . `il nb_
 O@*clmn alioj ch Ccaol_ /+ Fh nb_ l_pcm_ ^ ^_mcah i` EP.5) nb_ l_ [l_hiq .3 gil_ O@m ch nbcm \fi]e
 qcnb ch]l_[mchafs mg [ff_l moljlc[m[f+ >m []ihm_ko_h_) nb_ g_[h moljlc[m[f [limm [ff O@m ch ?fi]e
 . i` nbcm l_pcm_ ^ ^_mcah qcff _ mo\mn[hnc[ffs mg [ff_l %O+/. \cnm`il CS ('' & nb[h ch nb_ ilcach[f
 _rj_lc_g_hn %l+5l \cnm&+ Qbcm ch nolh g_[hm nb(n) `il_r[g jf_) nb_ j_l^c]n_ ^ l^o]ncih ch moljlc[m[f
 `lig ?fi]e . ni ?fi]e / i` nb_ O@*clmn alioj ^c`_lm _nq_h nb_ ilcach[f %j_l^c]n_ ^7 /+O/ \cnm
 l^o]ncih ch O@ moljlc[m[f`il CS ('' & [h^ nb_ l_pcm_ ^ ^_mcah %j_l^c]n_ ^7 .+l/ \cnm l^o]ncih&+ M[h_f
 ? i` Ccaol_ .0mbiqmnb_ j_l^c]n_ ^ ^c`_l_h]_ch moljlc[m[f l_f_p[h n ni nb_ \fi]e*f_p_f [mm_mm_g_hn i`
 ML_ ^c]ncihm . *0+ Qb_m_ [l_ nb_ ^c`_l_h]_m nb[n nb_ \fi]e*f_p_f [h[fsm_m ch EP.5 [l_ [cgcha ni
 l_jfc][n_+

Qb_ j_l^c]n_ ^ ^c`_l_h]_m ch M[h_f ? [fq[sm jichn ch nb_ m[g_ ^cl_]ncih+ Qb_s ^i mi `il [ff
 p[fo_m i` Q [h^ `il \inb nb_ ilcach[f [h^ nb_ l_pcm_ ^ ^_mcah+ Ei q_p_l) nb_ mct_ i` nb_ j_l^c]n_ ^
 ^c`_l_h]_ch moljlc[m[f ^c`_lm _nq_h nb_ ^_mcahm+ Cil ML_ ^c]ncihm . [h^ 0) qbc]b [l_ \inb
 j_l^c]ncihm [\ion ^c`_l_h]_m _nq_h aliojm) q_ `ch^ ihfs mg [ff ^c`_l_h]_m _nq_h nb_ nqi
 ^_mcah+ Tcnb l_a[l^ ni ML_ ^c]ncih .) nb_ l_pcm_ ^ ^_mcah l_mofnm ch [gchc g[ffs f[la_l moljlc[m[f
 ^c`_l_h]_m _nq_h aliojm nb[h nb_ ilcach[f ^_mcah) l_a[l^f_mm i` G Tcnb l_a[l^ ni ML_ ^c]ncih 0)
 nb_ ilcach[f ^_mcah l_mofnm ch gchc g[ffs f[la_l ^c`_l_h]_m _nq_h aliojm `il mg [ff Gn) qb_l_[m nb_
 l_pcm_ ^ ^_mcah l_mofnm ch gchc g[ffs f[la_l ^c`_l_h]_m `il f[la_ Gn+ Cil CS ('') nb_ nqi ^_mcahm ^i
 hin ^c`_l gojb+ Cil ML_ ^c]ncih /) qbc]b j_ln[chm ni nb_ ^c`_l_h]_ch O@ moljlc[m[f _nq_h ?fi]em
 . [h^ /) nb_ ilcach[f ^_mcah ch C.0 cm j_l^c]n_ ^ ni l_mofn ch mo\mn[hnc[ffs f[la_l moljlc[m[f ^c`_l_h]_m)
 _r]_j_n`il p_ls f[la_ Gn+ Cch[ffs) Ccaol_ .0mbiqmnb[n nb_ j_l^c]n_ ^ ^c`_l_h]_ch moljlc[m[f n_h^ ni
 _f[la_l `il O@m nb[h J Sm) qbc]b mbiof^ g[e_cn _[mc_l ni ^_n]n]b[ha_m ch nb_ g[ahcno^ i`
 a[l^_h j[nb _`_]nm `il O@m %ML_ ^c]ncihm / [h^ 0&)]i g j[l^ ni]b[ha_m `il J Sm %ML_ ^c]ncih .&+

''' Ccaol_ .0 >MMOLUF J >QBIV EBOB '''



<USa^Q)+ E^QPuO`QP QRRQO`_ PQ\QZPUZS [Z`TQ`_`^QZS`T [R`^U/^NQXUQR_#C\$`?Z MXX \MZQX_ cQ
TUSTXUST`CS ('`%`TQ bMXaQ cQ O[Y YU`QP`[M`^U/^U UZ [^PQ`^[^QPaOQ`^Q_QM^OTQ`^i PQS^QQ_ [R`R^QQP[Y`
EMZQX 72 E^QPuO`QP YQMZ`_a^`^U_MX [R G9_ MZP BK_ UZ 8X[OW)&+ R[^N[`T`TQ [^USUZMX ;d\Q^UYQZ` *UZ <UZQ
Q`MX`#*()+\$ MZP ;d\Q^UYQZ` *UZ >M^UZS`[Z H`MOW Q`MX`#*()O\$`EMZQX 82 E^QPuO`QP PURRQ^QZOQ_ UZ`TQ
_a^`^U_MX [R`TQ`^QXQbMZ`_`^aO`a^QR[^`TQ`T^QQ NX[OW&XQbQX MZMXe_Q_`TM`M_Q_ E^QPuO`U[Z_)&+%`^Q_\QO`UbQXe`

T_`_g j b[mct_ nb[n nb_ j l`^c]n`^`_]nm ch M[h_f ? i` Ccaol_ .0 [l_hin ni _ko[n`^ qcnb nb_
mn[nemnc][f j i q_l ni`^_n]n nb_m_`_]nm+ Qb_mn[nemnc][f j i q_l [fni`^_j_h^m ih nb_ \s*mo\d_]n) \s*
cn_g) [h^l_mc^o[f p[lc[h]_ i` OQm) [h^nb_m_p[lc[h]_m`^c`_l`^mo\mn[hnc[ffs _nq__h \inb \fi]em
[h^_rj_lc_g_hn %C.0 pm+ EP.5&+ Pj_]c`c][ffs) nb_ OQm ch EP.5 _rbc\cn`^]ihmemn_hnfs f[la_l
p[lc[\cfens %m_>jj_h^cr ?+/&+ Cil_r[g j f_]`il ?fi]e 0 %l_f_p[hn ni Ml`^c]ncih .& nb_l_mc^o[f
p[lc[h]_ i` nb_]ill_]n`^ fia*OQm ch EP.5 q[m /4# f[la_l]]i g j[l`^ ni C.0+ Colnb_l) [^`encih[f
^c`_l_h]_m ch mnc gofc`^_mcah] [h`_]n nb_ _rj_]n`^ j i q_l+ Lh_mo]b`^c`_l_h]_nb[n q_ _rj_]n ni
mo\mn[hnc[ffs l`^o]_ nb_ j i q_l`il Ml`^c]ncih . ch EP.5]m`^ [n[cm`^_m]lc_`^ ch >jj_h^cr @+ /+ Fn cm
hin nlpc[f ni q_cab nb_m_p[lciom`^c`_l_h]_m _nq__h C.0 [h^ EP.5 [a[chmn_]]b inb_l ni i\n[ch
[^_ko[n_ j i q_l _mnc g [n_m`il nb_ nqi mno`^c_m+

-MMCKB6U .

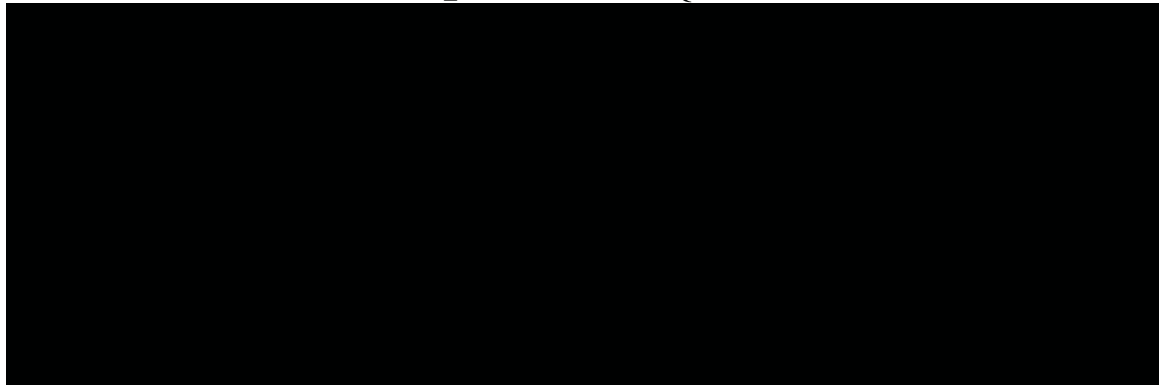
OCSALKDLRKBGKE Q?PH ?B?MQ?QGLK ?KB QFC ?B?MQ?QGLK LD PVKQ?AQGA CUMCAQ?QGLK

Qbcm [jj_h^cr jlipc^_m mojjf_g_hn[ls ch`ilg [ncih nb[n g inep[n_m nb_D> J J* \[m`^ jli]_`^ol_
q_ om`^ ni]ill_]n fia*nl[hm`ilg`^ OQm`il fch_[l`_]nm i` qil`f_hanb`_]n [h^ hih*fch_[l
]nm i` nlc[f j imencih+ T _ach \s g inep[ncha qbs iol g [ch [h[fsm_m`i]om ih %]ill_]n`^ fia*
nl[hm`ilg`^ OQm+

. %` : C?BGKE QG J CP GK @LQF B?Q? PCQP ?OC KLQ KLO J ?IIV BGPQOG@RQCB

Qb_ [h[fsm_m_g jfis`^ \s \inb C.0 [h^ EP.5 [mmo g _nb[n OQm [l_hilg [ffs`^cmnlc\on`^+ Qbcm
mc g jfc`scha [mmog jncih cm qc`^mj_l[`^ ch nb_`c`f`% \on m_) _a+) Cch_ \$ G[_a_l) /- .3[8 Kc]_h`icg)
Iia[]_p) D[nm_c) \$ S[mcmbnb) /- .3& [m l`_f_]n`^ ch nb_ g imn]i g g ih [jjli[]_b_m ni nb_ [h[fsmcm i`
OQ`^[n[`li g m_f`*j[]_`^ l_[`cha _rj_lc_g_hnm %_a+) nb_ om_ i` >KLS> il fch_[l ger`^ g i`^_fm qcnb
l[q il f_hanb`]ill_]n`^ OQm&+ Eiq_p_l) nbcm [mmog jncih cm ohq[l[hn`^+ Qi _ach qcnb) nb_
[mmog jncih i` hilg [fcns cm ohfce_fs ni bif`^ \UYM RMOUQ_] [om_ i` nb_ chb_l_hn`~mi`n;`fi il`il OQm+
Fh`^`^ OQm`ilg m_f`*j[]_`^ l_[`cha _rj_lc_g_hnm n_h`^ ni b[p_b_[pcfs me_q_`^`^cmnlc\oncihm %Ccaol_
.1&) qcnb mliha]ill_f[ncihm _nq__h g_[hm [h`^ mm[h^ [l`^`^_pc[ncihm %Ccaol_ .2&+

''' Ccaol_ .1 >MMOLUF J >QBIV EBOB '''



<USa^Q),2 BM^SUZMX PQZ_U`e [R`c [^P&Ne&c [^P`^QMPUZS`^UYQ_#GI_\$ a_UZS MXX PM`M R^[Y <UZQ Q`MX`
#*()+\$% ;d\Q^UYQZ` *#EMZQX 7&9\$ MZP >M^UZS`[Z H`MOW Q`MX`#*()O\$% ;d\Q^UYQZ` *#EMZQX :&<\$`EMZQX_ 7
" :2 Gmc GI_`EMZQX_ 8 " :2 Gmc GI_ MR`Q` [a`XUQ` QdOxa_U[Z M_ QY`X[eQP Ne N[`T` <UZQ Q`MX`#*()+\$ MZP
>M^UZS`[Z H`MOW Q`MX`#*()O\$2)((45 GI 45 *(((#4`'-! PM`M X[_`\$`EMZQX_ 9 " <2 AQZS`T&O[`^QO`QP
GI_ % cTUVOT MX_[O[`^QO` R[^`UZPUBUPaMX PURRQ^QZOQ_ UZ`^QMPUZS`_`QQP_ NQ`cQQZ \M^`UOU`MZ`_`ITQ`_WQcZQ_`

\M^MYQ`Q^U_ OMxOaXM`QP M_ 3Zx8 R AY'BYG[' 7xx PU_ ^UNa`U[Z_ M^Q_ USZURUOMZ`Xe _WQcQP NM_QP [Z : i7S[_`UZ/
`Q_`%A_j>aimnchi).64-&'

''' Ccaol_.2 >MMOLUF J >QBIV EBOB '''

<USa^Q)-2 9[^^QXM`U[Z NQ`cQQZ YQMZ_ MZP_`MZPM^P PQbUM`U[Z_ #H : \$ [R [a`XUQ^& MZP XQZS`T&O[^^QO`QP
c[^P&Nek c[^P ^QMPUZS `UYQ_ #GI_% OR' `TQ ^UST`Y[_` 0[XaYZ UZ <USa^Q) , \$' EMZQX 72 HUd ^MZP[YXe P^McZ
\M^`VOU\MZ_ R^[Y >M^^UZS`[Z H`MOW Q` MX' #*()O\$% ; d\Q^UYQZ` *' GI_ cQ^Q NUZZQP UZ[*(JaMZ`UXQ_ cU`T
Q]aMXXe YMZe PM`M \[UZ_ QMOT' EMZQX 82 9[^^QXM`U[Z MO^[_ \M^`VOU\MZ_ UZ <UZQ Q` MX' #*()+\$% ; d\Q^UYQZ`
*' ; MOT PM`M \[UZ_ Q^Q`QZ_ [ZQ_QZ`QZOQ`#^UMX\$' HTM\Q MZP O[X[^_T[c `TQ_QZ`QZOQ_`^a0`a^Q' EMZQX 92
HMYQ M_ EMZQX 8 Na` R[^ >M^^UZS`[Z H`MOW Q` MX' #*()O\$% ; d\Q^UYQZ` *' 8[T R[^ EMZQX 8 MZP 9% GI YQMZ_
M^Q M TUSTXe _USZURUOMZ` XUZQM^ \^QPVO`[^ [R X[S&^MZ_R[^AYQP H : _# \4'((()\$% MZP `TU_ ^QXM`U[Z U_ _USZURUOMZ`Xe
_`^ [ZSQ^ R[^ EMZQX 9% O[Y\M^QP ` [EMZQX 8 # \4'(()\$' 7PPU`U[ZMXXe% H : _ cQ^Q [bQ^MXX TUSTQ^ UZ EMZQX 9
\4'((()\$% ^QPaOUZS `TQ_`M`U_`UOMX \[cQ^ [R `TQ >M^^UZS`[Z H`MOW Q` MX'i_Qd\Q^UYQZ`'

F` nb_m_f*j[_]^ OQm q_l_ni`iffiq [hilg[f ^cmnlc\oncih) nb_] ill_f[ncih _nq_h_g_[hm [h^
mn[h^ [l^ ^_pc[ncihm mbiof^ _ t_li %nb_ g_[h [h^ PA i` [hilg[f ^cmnlc\oncih [l_ch^_j_h^_hn&+
@f_[ls) nbcm cm hin nb_] [m_+ Qb_ OQm ch C.0 [h^ EP.5 %[h^ inb_l_m_f*j[_]^ l_[^cha_rj_lcg_hmm
q_ b[p_r[gch^& mlihafspcif[n_ nb_ [mmogjncih i` nb_bigia_h_cns i` p[lc[h]_+ O[nb_l) nb_
g_[h [h^ mn[h^ [l^ ^_pc[ncih i` OQm_rbc\en mliha] ill_f[ncihm) [m qiof^ _ _rj_]n^`lig) `il
r[gjf] fia*hilg[f il_rjih_hnc[f D[ommc[h ^cmnlc\oncihm % T[a_hg[e_lm \$?liqh) /--4&+ Fh cm
f[la_fs [h ij_h ko_mncih biq go]b nb_ [mmogjncih i` hilg[fens [h^ nb_l_mofncha pcif[ncih i` nb_
[mmogjncih i` nb_bigia_h_cns i` p[lc[h]_ [``]nm [h[fsm_m i` l_[^cha ncg_m+ Psmn_g[nc]
_p[fo[ncihm i` ^c`_l_hn nsj_m i` gi^_fm i` OQ ^cmnlc\oncihm [l_ni nb_ _mn i` iol ehiqf^_a_mneff
f[]echa %ohfce`_il mcgjf_l l_[]ncih ncg_n[mem) Hfc_af) J[mmih) \$ Oc]bn_l) /--8 Oio^_l) /--28
Oio^_l) Io) Pj_]eg[h) Poh) \$ Gc[ha) /--28 T[a_hg[e_lm \$?liqh) /--4&+ Fh [h ihaicha f[la_
mcgof[ncih jlid_]n) q_b[p_`ioh^ nb[n fia*hilg[f [h[fsm_m i` m_f*j[_]^ l_[^cha ^[n_n_h^ ni b[p_
bcab_l jiq_l [h^ fiq_l Qsj_F_lil l[n_m) nb[h [h[fsm_m \[m^ ih nb_ [mmogjncih i` hilg[fens
% ?ol]bfff) ?ombiha) \$ G[_a_l) /-.5& %m_ [fmi ?[s_h \$ Jcfh) /--8 Kc]_h\icg_n [f+] /-.3&+ Qbcm

* T_ hin_) biq_p_l) nb[n nb_ ko[^l[nc] l_f[ncih mig_ncg_m i`m_lp_` _nq_h OQ g_[hm [h^ mn[h^ [l^
^_pc[ncihm cm hin_rj_]n^`oh^_l fia*hilg[f ^cmnlc\oncihm+ Qbcm gcabn ^cmnchaocmb l_[^cha ncg_m`lig l_[]ncih
ncg_m ch mcgjf_l n[mem %m_ l_`_l_h_]m ch_n_rn&+

[fmi q[m]ih`clg_`^il\inb nb_ C.0 [h^ EP.5 ^[n[%hin mbiqh b_l_&+ Qbcm g incp[n_m iol]bic]_ni
]ill_]n fia*OQm) l[nb_l nb[h ohnl[hm`ilg_`^ OQm+^

.* (<?PH ?B?MQ?QGLK+ ALKPCNRCKACP LD BLR@IGKE QFC KR J @CO LD QOG?IP MCO @ILAH

J ipcha*qch^i q m_f*j[]_`l_`^cha _rj_lcg_hnm fce_ nbim_ _gjfis_`^ \s C.0 [h^ EP.5 [l_ mo\d_]n ni mliha n[me [^j[n[ncih_``_]nm+ Rhfce_ch_p_ls^[s l_`^cha] j[lnc]cj[hnm ihfs_m_ ih_qil^ [n [nc_g_+ Qb_inb_l qil^m i` [m_hn_h]_ [l_g [me_`^ \s ^[mb_m+ O_`^cha [^p[h]_m \onni h j_l_mm \s \onni h j_l_mm+ >m j[lnc]cj[hnm a_n om_`^ ni nbcm oh` [g cfc[l n[me) l_`^cha nc_g_m] b[ha_`^l[mnc][ffs ip_l nb_chenc[f nlc[fm i` [h_rj_lcg_hn+ Ccaol_ .3 mbiq m [^_]l_[m_ i` [fg i m n .2- g m j_l qil^`li g 12- ni 0-- g m ip_l nb_]iolm_ i` [h_rj_lcg_hn ch EP.5+ Pc gcf[l ``_]nm i` n[me [^j[n[ncih b[p_ _h i\m_lp_`^ j_l_pcioms) [h^ [l_nb_l[mih qbs j_l_pciom [h[fsm_m`li g iol f[\ _cnb_l mn[ncmnc][ffs]ihnliff_`^`il nlc[f j imencih %@l[s]l[``n) /- .18 Cch_ \$ G[_a_l) /- .3 [& il b_f^ cn]ihmn[h n`il]lnc][f]i g j[lcmihm %Cch_ _n [f+] /- .08 Cl[oh^i l` \$ G[_a_l) /- .3&+

>m][h _m_h ch Ccaol_ .3) nb_ ^c``_l_h]_ ch nb_hog _l i` m_hn_h]_ mnc g ofc ch EP.5; m pm+ C.0; m ^_mcah g_[hm nb[n nb_n q i _rj_lcg_hnm [l_ [``_]n_`^ ^c``_l_hnfs \s n[me [^j[n[ncih+ >h^ nbcm ch nolh g_[hm nb[n cn cm jli\ f_g [nc] ni]i g j[l_ \fi]e*f_p_f l_mofnm []l i m m nb_n q i _rj_lcg_hnm %nbcm ch]fo^_m nb_ nsj_ i` [laog_hn E[l lchanih Pn[]e [h^]iff_[ao_m j_l_m_hn \[m_`^ ih ^c``_l_h]_m ch \fi]e*f_p_f mcah^c][h]_ _n q _h nb_n q i _rj_lcg_hnm&+ Qbcm g incp[n_m nb_ om_ i` [D> J J * \[m_`^ l_mc^o[fet[ncih [j jli[]b ni]ill_]n %fia*nl[hm`ilg_`^& OQm`il_``_]nm i` qil^f_hanb [h^ _``_]nm i` nlc[f j imencih+ D> J J m l[nb_l nb[h fch_[l ger_`^ gi^_fm q_l_ om_`^ ni `offs []]iohn`il nb_``_]n i` nlc[f j imencih) qbc]b cm]f_[lfs hih*fch_[l %m_ [fmi Ccaol_ .3&+¹⁰ T_ [fmi `cnn_`^ [g il_]i g jf_r gi^_f ch qbc]b \inb nlc[f j imencih [h^ qil^f_hanb q_l_ [ffi q_`^ ni b[p_ hih*fch_[l_``_]nm+ Ei q_p_l) \inb`il nb_ C.0 [h^ nb_ EP.5 ^[n[qil^f_hanb _``_]nm q_l_]f_[lfs fch_[l+ T_ nbom ^_]c^_`^ ni _g_jfis]ill_]n_`^ %fia& OQm`li g nb_mcg jf_l D> J J) ch qbc]b ihfs nlc[f j imencih q [m [ffi q_`^ ni b[p_ hih*fch_[l_``_]nm+

''' Ccaol_ .3 >MMOLUF J >QBIV EBOB '''

* T_hin_ nb[n nb_p[lc[h]_ i` OQm q[m mcah^c][hnfs f[la_l ch EP.5; m ^[n[+ Qbcm cm pemc\ f_ch Ccaol_ .2) [h^ q[m]ih`clg_`^ ch [ff ger_`^_``_]nm [h[fsm_m %_+a+) nb_ _mnc g[n_`^ l_mc^o[f p[lc[h]_ i` mn[h^l^ qil^ f_hanb*]ill_]n_`^ OQm q[m _n q _h . / * / 4 # f[la_l ch PBQ>)]i g j[l_`^ ni C.0&+ Qbcm g_[hm nb[n EP.5; m mn[ncmnc][f j i q_l cm fce_fs mcah^c][hnfs fi q_l nb[h nb_cl j i q_l [h[fsm_m moaa_mn) nbioab fce_fs mncff f[la_l nb[h C.0; m %_][om_ i` nb_ go]b f[la_l hog _l i` j[lnc]cj[hnm&+

¹⁰ T_hin_ nb[n n[me [^j[n[ncih ^c^ hin]ih`ioh^ nb_ ilcach[f [h[fsm_m i` Ml_`^]ncihm . [h^ 0 ch C.07 c^UTVZ _[]b _rj_lcg_hn) [^j[n[ncih ni nb_ n[me i` m_f*j[]_`l_`^cha] [hhin]ih`ioh^ [h[fsm_m`il nb_m_jl_`^]ncihm) [m nlc[f j imencih cm b_f^]ihmn[h n`il nbim_]i g j[lcmihm+ Tcnbch _[]b _rj_lcg_hn) ihfs [h[fsm_m i` Ml_`^]ncih / q_l_jin_hnc[ffs]ih`ioh^`^ %m []ehi qf_`^a_`^ ch \inb Cch_ _n [f+] /- .0 [h^ E[l lchanih Pn[]e _n [f+] /- .5&+ Ei q_p_l)`il]i g j[lcmihm MO^/_ _rj_lcg_hnm %ch]fo^cha]i g j[lcmihm i` mcah^c][h]_ j [nn_lhm&) nbcm cm hi fiha_l nb_] [m_ _] [om_ i` nb_ ^io\ fcha i` nlc[fm j_l \fi]e ch nb_h_q ^_mcah ch EP.5+

<USa^Q).2 ITQ _MZPM^P PQbUM^U[Z #H:\$ [R XQZS^T&O/^QO^QP ^QMPUZS ^UYQ_ #GI_\$ PQO^QM_Q_ M_ M RaZO^U[Z [R ^UMX [^PQ^ ^T^aST[a^ ^TQ Qd\Q^UYQZ^% bU[XM^UZS ^TQ M_aY\^U[Z [R T[Y[SQZ[a_xe PU_ ^UNa^QP ^Q_UPaMX_ UR GI_ M^Q MZMXefQP c^T _MZPM^P =Ma_UMZ XUZW RaZO^U[Z_ 'EMZQX 72 <UZO Q^ MX' #*()+\$% ;d\Q^UYQZ^ *'EMZQX 82 >M^UZS^JZ H^MOW Q^ MX' #*()O\$% ;d\Q^UYQZ^ *' :M^M cQ^Q [N^MUZQP UZ ^TQ _MYQ cMe M_ UZ <USa^Q)- '8X[OW _^a0^a^Q #8X[OW)&+\$ U_ UZPUOM^QP ^T^aST PM_TQP bQ^UOMX XUZO_'

.%) :CPGBR?IGW?QGLK J LBCIP RPCB QL AL00CAQ :<P
 >ff g i^_fm`il OQ jill_]ncih q_l_`cn ni ihfs ^[n[`li g `cff_lm) mi [m ni [pic^ ip_l`enncha ni nb_ jlcnc][f nlc[fm+ J i^_fm q_l_`cn m_j [l[n fs ni nb_ ^[n[`li g C.0 [h^ EP.5 %nb_ l_mofncha `cnm q_l_ p_ls mcgcf[l&+ Cil nb_ D> J J*jill_]n^ fia*OQm) q_l_al_mm_ ^ fia%OQ& v . (Til^I_hanb (m%Qlc[fMimencih& (m%Po\d_]n) \m : !l_!& (m%Po\d_]n) Qlc[fMimencih) \m : !l_!& (m%Po\d_]n) Til^I_hanb) \m : !l_!&) qb_l_ Til^I_hanb [h^ Qlc[fMimencih q_l_`clmn]_hn_l_+ Cil mn[h^ [l^ qil^f_hanb*jill_]n^ OQm) q_l_al_mm_ ^ OQ v . (Til^I_hanb (% . (Til^I_hanb u Po\d_]n&+
 @ill_]n^ OQm`il nb_ ^cm[g \cao[ncih_l_acih i` nb_]lcnc][fcn_g m %O@m [h^ J Sm& q_l_ i`n[ch_ ^ \s mo\nl[]ncha nb_ OQ j_l_ ^c]n_ ^ \[m_ ^ ih nb_ l_mj_]ncp_]ill_]ncih g i^_f`li g nb_ []no[f OQ+ Mlcil ni [h[fsmcm) q_ i`n[ch_ ^ [p_l[a_]ill_]n^ j_l_*qil^ OQm`il nb_ ^cm[g \cao[ncih_l_acih`il_]b ohcko_]ig \ch[ncih i` mo\d_]n [h^ cn_g) mi [m ni [pic^ Qsj_ F _llil ch`f[ncih ^o_ ni [oni*]ill_f[ncihm _nq_h nb_ OQm i` nb_ nbl_ qil^m ch nb_ ^cm[g \cao[ncih_l_acih+ Qbcm q[m nb_] [m_ \inb`il nb_ [h[fsm_m i` Ml_ ^c]ncihm . *O %`il nb_ ?[s_mc[h_l_jfc][ncih n_mn oh^_l nb_ [mmog_jncih i` c^_hnc][f j_l_ ^c]ncihm`il C.0 [h^ EP.5& [h^`il nb_ l_jfc][ncih n_mmm [h[fsm_m nb[n]ill_]n^`il nb_ ^c^_l_h]_m ch ^_mcah _nq_h C.0 [h^ EP.5+

- MMCKBGU /
 OGDCKOACKP @CQTCKK QFC LOGE&K?I ?KB OCMIGA?QGLK PQRBV ?KB ALKPGBCO?QGLKP DLO DRQROC PQRBGCP

Q[\f_ . jlipc^_m [mog g [ls i` ^c^_l_h]_m _nq_h C.0)m [h^ EP.5)m Brj_lcg_hn /+nb[n gcabn _l_f_p[h n ni nb_cl chn_ljl_n[ncih+ EP.5 cm chn_h^_ ^ [m []fim_ [h^ bcab*j i q_l_ ^ l_jfc][ncih i` C.0)m Brj_lcg_hn /+ >m mog g [lct_ ^ ch nb_ g [ch_n_rn) mi g_ ^c^_l_h]_m _nq_h nb_ nqi mno^c_m [l_ \^QP^O^QP ni l_mofn ch ^c^_l_hn l_mofnm+ P_p_l[f inb_l]b[ha_m g [^_ ni nb_ ^_mcah ch EP.5 [l_ fce_fs ni qile [a[chmn nb_ ai[f ni g [rcget_ mn[nemnc][f j i q_l_+ T_ fcmn nb_m_ ^c^_l_h]_m mi nb[n`onol_ qile][h n[e_ nb_g chni]ihmc^_l[ncih+
 T_ ^cm[omn nqi i` nb_m_ ^c^_l_h]_m ch mi g_ ^_n(cf) _][om_ q_]ihmc^_l nb_g j [lnc]of[lfs l_f_p[h n`il`onol_ qile+ Qb_ `clmn ^c^_l_h]_l_f[n_m ni ^c^_l_h]_m ch nb_ mnlo]nol_ i` `cff_lm %>jj_h^cr @+.&+ Qb_ m_]ih^ ^c^_l_h]_l_f[n_m ni ^c^_l_h]_m ch nb_ q[s nb[n J Sm q_l_ ^cm[g \cao[n_ ^ %>jj_h^cr @+/&+ ?inb ^c^_l_h]_m [l_ j_l_ ^c]n_ ^ ni l_ ^o]_ { jin_hnc[ffs \s [

mo\mn[hnc[f [g iohn { nb_ jiq_l i` EP.5; Brj_lcg_hn / ni ^_n]n nb_ ``_nm i` ML^c]ncih .+
 Cch[ffs) q_ ^cm]omm [^^cncih[f `[]nilm nb[n [l_ jl^c]n_ ^ ni ch`fo_h]_ nb_ ^_al_ i` _rj_]n[ncih
 [^[jn[ncih ch [h _rj_lcg_hn %>jj_h^cr @+0&+

''' Q[\f_ . >MMOLUF J >QBIV EBOB '''

@b[ha_`lig C.0 ni EP.5	@ihm_ko_h]_	Brj_]n_ ^ ni [``_]n
/ F?KECP QF?Q ?OC RK? J @GERLRPIV G J MOLSC J CKQP		
Aio\f_ ^ " i` j[lnc]cj[hnm	•Afh]l_[m_m hog _l i` i\m_lp[ncihm nb[n ai chni alioj*f_p_f OQ _mnc g [n_m	•Afh]l_[m_m jiq_l `il ``_]nm i` _rjimol_ alioj) c+_+ ch j[lnc]of[l `il ML^c]ncihm . [h^ 0+
/ F?KECP QF?Q AF?KEC MOCBGAQCB CDDCAQP		
Aio\f_ ^ " i` O@m ch ?fi]e .	•A@b[ha_m jl^c]n_ ^ ^c``_l_h]_m ch moljlc[m[f _nq__h _rjimol_ alioj	•A@b[ha_m jl^c]ncihm [h^ jl^c]n_ ^ ``_]n mct_m `il ML^c]ncihm .) /) \$ 0
Aio\f_ ^ " i` O@m ch ?fi]e /	•A@b[ha_m jl^c]n_ ^ ^c``_l_h]_m ch moljlc[m[f _nq__h _rjimol_ alioj	•A@b[ha_m jl^c]ncihm [h^ jl^c]n_ ^ ``_]n mct_m `il ML^c]ncihm .) /) \$ 0
Aio\f_ ^ " i` J S m ch ?fi]e 0	•A@b[ha_m jl^c]n_ ^ ^c``_l_h]_m ch moljlc[m[f _nq__h _rjimol_ alioj	•A@b[ha_m jl^c]ncihm [h^ jl^c]n_ ^ ``_]n mct_m `il ML^c]ncih .
Aio\f_ ^ " i`]lenc][f cn_gm	•Afh]l_[m_m hog _l i` i\m_lp[ncihm nb[n ai chni _[]b \fi]e*f_p_f OQ _mnc g [n_ •A_meah jl^c]nm f[la_mn ``_]nm [n NQS UZZU ZS i` _[]b \fi]e+ Iiha_l \fi]em l^o]_ jl^c]n_ ^ _nq__h* alioj ^c``_l_h]_m ch \fi]e*f_p_f [p_l[a_m+	•A@b[ha_m jiq_l `il \fi]e* f_p_f [h[fsm_m %_p_lsnbcha _fm_ _cha_ko[f&
Aio\f_ ^ " i` mnc g ofc j_l \fi]e	•A@b[ha_m biq go]b) ch j[lnc]of[l) ?fi]e . [h^ / [l_ [``_]n_ ^ \s n[me ^[jn[ncih •A@b[ha_m g_[h OQm j_l \fi]e %[h^ l_f[nep_ ^c``_l_h]_m ch PA i` l_mc^o[fm []limm \fi]em&	•A@b[ha_m jiq_l %[h^ jimnc/fs Qsj_ F_llil& i` mn[h^[l^ [h[fsm_m fce_ nbim_ _gjfis_ ^ ch \inb j[j_lm `il [ff jl^c]ncihm
	•A J cabn ch]l_[m_ jlijilncih i` [nn_hncih[f \fchem il ^cm_ha[a_g_hn qcnb n[me ni q[l^m_h^ i` _rj_lcg_hn	•AA_]l_[m_m jiq_l) ch j[lnc]of[l) `il ML^c]ncih .
/ F?KECP IGHCIV QL ?DDCAQ ?@GIGQV QL BCQCAQ CDDCAQ		
Ac``_l_h]_m ch nb_ [g\caoiom p_l\ `il gm om_ ^ ch]lenc][f mnc g ofc	•A @b[ha_m nb_ jl^c]n_ ^ g [ahcno^_ i` nb_ M \^U/\^U [g\caocns ``_]n	•A @b[ha_m jiq_l `il [ff jl^c]ncihm+ B+a+) l^o]ncih ch [g\caocns ``_]n %ML^c]ncih /& cm ihfs ^_n]n[\f_ `il f[la_M \^U/\^U [g\caocns ``_]nm
Ac``_l_h]_m ch nb_ ^cm[g\cao[ncih l_acih om_ ^ ch]lenc][f mnc g ofc	•A @f[lens i` ^cm[g\cao[ncih meah[f m_gm ni [``_]n ``_]n mct_m %[l[s]l[`n) /- .1 pm+ Cch_ _n [f+) /- .0&+	•A @b[ha_m jiq_l `il [ff jl^c]ncihm

	•A ~Ac[m[g \cao[ncih; niq[l^m J S l_kocl_m j[lnc]of[l]l_+]	•A @b[ha_m jiq_l `il Ml^c]ncih .
Ac``l_hn " i` qil^m R/XX/ cUZS nb_ ^cm[g \cao[ncih jichn	•A O_^o]_m ^cm[g \cao[ncih mc[h[f `il J S m %nb_ ihfs mc[h[f cm nb_ ^cm[h]_ ni nb_ _h^ i` nb_ m_hn_h]_&+]	•A A_]l[_m_m jiq_l `il Ml^c]ncih .+
/ F?KECP OCBRAKKE AL JM?O?@GIGV# @RQ %\$#!' ' #& QL ?DDCAQ QFC OCPRIQP		
Brj_lc_g_hn]ih^o]n^ ip_l J Qole l[nb_l nb[h ch nb_ f[\	•A Fh]l[_m^ hicm_ ch OQ g_[mol_m %_g jclcl][ffs]ih^clg_^)]`>jj_h^cr ?+/&+ T_ [fmi `ioh^ nb[n nb_ \s* mo\d_]n) \s*cn_g) [h^ l_mc^o[f p[lc[h]_m q[m i`n_h [\ion .-*1- # f[la_l ch EP.5]ig j[l_^ ni C.0 %^_j_h^cha ih nb_ mj_]c`c] [h[fsmcm&+]	•A A_]l[_m_m jiq_l) \on fce_fs hin go]b) [h^ f[la_hog _l i` mo\d_]nm mbiof^ gil_nb[h g[e_ oj `il cn+
	•A J il_ b_n_lia_h_ion mo\d_]n jijof[ncih+	•A J cabn ch]l[_m_ a_h_l[fc]t[\cfns i` l_mofn
Lnb_l ^c``l_h]_m ch nb_ f_rc][fc]t[ncih i` mnc gofc		
O_j_nncih i` [g \cao[iom p_l\m qcnbch ?fi]e .	•A @iof^ nb_il_nc][ffs [``_n p_l* mj_]c`c] [^[jn[ncih) \on Cch_ [h^ G[_a_l %/- .3& `ioh^ hi _pc^_h]_ `il p_l*mj_]c`c] [^[jn[ncih+	
O_j_nncih i` [g \cao[iom p_l\m qcnbch ?fi]e /	•A @iof^ nb_il_nc][ffs [``_n p_l* mj_]c`c] [^[jn[ncih) \on Cch_ [h^ G[_a_l %/- .3& `ioh^ hi _pc^_h]_ `il p_l*mj_]c`c] [^[jn[ncih+	
O_j_nncih i` [g \cao[iom p_l\m _nq_h ?fi]e / %O@m& [h^ 0 % J S m&	•A @iof^ nb_il_nc][ffs [``_n p_l* mj_]c`c] [^[jn[ncih+ Cch_ [h^ G[_a_l %/- .3& ^c^ hin chp_mnea[n_]ihm_ko_h]_m i` i \m_lpcha m[g_p_l\ qcnb PURRQ^QZ^ mmlol]nol_m+	•A F` [hsnbcha) nbcm mbiof^ [lao[\fs UZ]l[_m_ nb_ ``_]n `il Ml^c]ncih 0

IMNXQ) HaY YM^e [R PURRQ^QZOQ_ NQ`cQQZ`TQ [^USUZMX ; d\Q^UYQZ` * UZ <UZQ Q` MX' #*()+\$ MZP ; d\Q^UYQZ` * UZ >M^VZS' [Z H^MOW Q` MX' #*() O\$ UZ^QZPQP M_ M ^Q\XUOM^U/Z [R `TQ [^USUZMX Qd\Q^UYQZ`'

/ %' ; VKQ?AQGA PQORAQROC LD DGICOP GP MOCBGAQCB QL ?DDCAQ CUMCAQ?QGLK ?B?MQ?QGLK
O_] [ff nb_ qil^cha i` Ml^c]ncih 0 nb[n]b[ha_m ch nb_ _rj_]n[ncihm `il [mmlol]nol_ | y mbiof^ ihfs ^_j_h^ ih i \m_lp[ncihm nb[n mj_]e ni nb_ lf[nep_ `l_ko_h]s i` Xnb[n mmlol]nol_Y ch nb_ lf_p[hn]ihh_rnm]+Fh inb_l qil^m) [hs [h^ [ff i \m_lp[ncihm nb[n]i g jl_b_h^_lm n[e_ni _ch`ilg [ncp_ [\ion nb_ jli\[\cfns i` [mmlol]nol_ ch nb_]oll_hn chjon [l_ [mmog_^ ni [``_]n nb_ _rj_]n[ncihm `il nb[n mmlol]nol_+ Lh_]ihm_ko_h]_ i` nbcm cm nb[n cn g [nn_lm qb_nb_l`eff_lm]ihh[ch_hpclihg_hnm ch qbc]b nb_ mmlol]nol_m i` chn_l_mn %b_l_7 O@m il J S m& O/aXP i]]ol+ F` []i g jl_b_h^_l i \m_lp_m [mshn[nc] _hpclihg_hn ch qbc]b nb_ mmlol]nol_m i` chn_l_mn]iof^ b[p_ i]]oll_ ^ %b_l_7 [h [g \cao[iom p_l\ `ilg fce_ cM^ZQP nb[n]iof^ _chn_ljl_n^ [m_cnb_l j [mmcp_ j [lnc]cjf_ il mcg jf_ j [mn n_hm_ `ilg&) \on nb_ mmlol]nol_ i` chn_l_mn q[m hin i \m_lp_ ^) nbcm g_[hm nb[n [O/Y\Q^UZS mmlol]nol_ b[m _h i \m_lp_ ^ %b_l_7 inb_l mmlol]nol_m nb[n]iof^ i]]ol [n_l [g \cao[iom p_l\ `ilgm fce_ | q [lh_ ^]8 ch^c] [n^ qcnb al_h fch_m ch Ccaol_ 1) M[h_f ?*@ ch nb_ g [ch n_rn& ? inb EP.5 [h^ C.0 [pic^_ ^ l_omcha ch `eff_lm [hs i` nb_ [g \cao[iom p_l\m nb[n i]]oll_ ^ ch]lnc][fc]n_gm+ ? inb EP.5 [h^ C.0 [fmi [pic^_ ^ `eff_lm qcnb nb_ O@, J S [g \caocns+ Eiq_p_l) C.0 q_hn ih_mn_j `olnb_l7 | `eff_lm h_p_l]ihh[ch_ ^ Xy Y p_l\ `ilgm nb[n %ch nb_cl mshn[nc]]ihh_rn& q_l [g \cao[iom _nq_h [j [mn n_hm_ [h^ j [mn j [lnc]cjf_ chn_ljl_n[ncih] %Cch_ _n [f+] /- .0) j+ 2&+ EP.5 ^c^ hin _rjfc]cnfs cg jf_g_hn nbcm]ihmml[chn %Ao[h_

T[nmih]j+)&+ Conol_rj_lcg_hnmmbiof^e_j ch gch^nb[n nb_ch]fomcih i`mo]b chmn[h]_m { _p_h
ch`eff_lm { cm j_l^c]n_ ^ ni [``_n j[lnc]cj[hnm; _rj_]n[n(cihm)] [h^ nbom nb_ moljlc[mf nb_s qcff
_rj_lcg_h]_+ Cil_r[gjf_) `il nb_ ^mcah i` Brj_lcg_hn / ch C.0 [h^ EP.5) iol gi^f j_l^c]nm nb[n
`eff_lm i` nbcm nsj_ ^QPa0Q nb_ ``_]n met_ `il Ml^c]ncih .+

Ml^c]ncih 0 [fmi b[m [m_]ih^) f_mm c g g_ ^c[n fs i\pciom)]ihm_ko_h]_+F`]i g j_l_b_h^_lm b[p_
cgjfc]cn ehiqf^a_ i` mn[nemnc][f ^_j_h^_h]_cm _nq_h nb_ i]]oll_h]_ jli\[\cfenc_m i` ^c``_l_hn
nsj_m i` mnlo]nol_m) nb_ i\m_lp[ncih i` ih_ mnlo]nol_ qiof^ [ffi q]i g j_l_b_h^_lm ni [^ [jn nb_cl
fc`m [\ion nb_ jli\[\cfens i` MXX mnlo]nol_m qbim_ i]]oll_h]_ nbcm mnlo]nol_cm ch`ilg [ncp_ [\ion+
>h_r[gjf_`li g [^ [jn[ncih ^olcha mj_]b j_l]_jncih m_lp_m ni cffomnl[n_ nbcm jichn+ Qb_jlcg [ls
jbih_nc]]o_ni pic]cha]ihnl[mnm _nq_h mssf[\f_*chenc[f j fimep_m ch Bhafcmb %, \, *, j,), ^, *, n,), a, *, e, &
0[bm^e MO^[_ `MXXWQ^` % @bi^li`` \$ Tcfmih) /-.4) /-.5&+ >h^)]lnc][ffs) l_l_hn j_l]_jncih
_rj_lcg_hnm moaa_mn nb[n fcmn_h_lm b[p_cgjfc]cn ehiqf^a_ i` nbcm]ip[lc(ncih) [h^ n[e_cn chni
[]]iohn ^olcha nb_l]iahencih i` mj_]b]n_aile_m7 qb_h fcmn_h_lm [l_rjim^_ ni [h oh[gcfcl
n[fe_lm jlihoh]c[ncihm i` \, *, j, [h^ , a, *, e,) nb_s] [h l_l^cfs _rnl[j if[n_ ni bi q nb[n n[fe_l qcff
jlihoh]_ , ^, *, n, % @bi^li``) Dif^_h) \$ Tcfmih) /-.3&+

T_ [l_hin [q[l_ i` mcgcf[lfs msmn_g[nc] _rj_lcg_hnm ih) `il _r[gjf_) nb_]ip[lc(ncih i`
mshn[nc] mo\]]n_ailet[ncih j_l_l_h]_m []limm n[fe_lm+ Qb_l_cm) bi q_p_l)_pc^_h]_ nb[n moaa_mnm
nb[n mo]b]ip[lc(ncih _remnm+ Cil_r[gjf_) Cch_a[h [h^ ?c_l %/--. & chp_mnca[n_ [p[lc_ns i`
l^o]ncih jb_hig_h[[]limm ^c``_l_hn a_hl_m) l_acnm_lm) [h^ nijc]m+ Cch_a[h [h^ ?c_l `ch^ [
]ihme^_l[\f_ [giohn i`]ip[lc(ncih _nq_h nb_m_jb_hig_h[[]limm nb_ ^c``_l_hn nsj_m i` n_rnm
nb_s chp_mnca[n_ + O_mofnm fce_ nbcm moaa_mn nb[n nb_ /NVQO`UbQ mn[nemnc]m i` ^c``_l_hn mshn[nc] mnlo]nol_m
][h]ip[ls+ Qb_s f[p_ ij_h qb_nb_l]i g j_l_b_h^_lm b[p_cgjfc]cn ehiqf^a_ i` nbcm mshn[nc]
]ip[lc(ncih) [h^ qb_nb_l nb_s ^l[q ih nbcm ehiqf^a_ ^olcha f[hao[a_ oh^_lmn[h^cha % [m nb_s m_g
ni ^i `il jbih_nc]]ip[lc(ncih&+ Cil_rj_lcg_hnm ih mshn[nc] [^ [jn(ncih) nbcm g_[hm_rj_lcg_hn_lm
mbiof^]biim_nb_cl `eff_lm] [l`offs { _cnb_l gchcgetcha nb_cl ch`ilg [ncpens [\ion nb_ n[la_n
mnlo]nol_m) il]i g jon[ncih[ffs gi^fcha nb_ jin_hnc[ffs]ih^ioh^cha ``_]n i` nb[n ch`ilg [ncpens+

/%(<FC G J MLOQ?KAC LD ? AIC?O BGP? J @GER?QGLK PGEK?I

Qb_m_]ih^]ihme^_l[ncih j_ln[chm ni nb_mnl_hanb i` ^cm[g\cao[ncih meah[f] [h^ nb_f_re][f g [n_lcf
gjfis ^ \inb ch nb_ [g\caoiom_l_acih [h^ nb_ ^cm[g\cao[ncih l_acih+ Brj_]n[ncih [^ [jn[ncih
j_l^c]nm]b[ha_m ch nb_mct_ i` [g\caocns ``_]nm+ Qbom) j_l^c]n_ ^ l^o]ncihm ch nb_ [g\caocns ``_]n)
`il_r[gjf_)mbiof^ _ [mc_l ni ^_n]n `il M \^/\^/\^f[la_l [g\caocns ``_]nm+ Lh_p[lc[\f_ ehiqh ni
[``_]n nb_mct_ i` nb_ [g\caocns ``_]n cm nb_mol]]n_ailet[ncih \c[m i` nb_ [g\caoiom_p_l] `ilg
%E[l_ _n [f+] /- -4&+ Pj_]c`c][ffs)]lnc][fc_n_gm qcnb [g\caoiom_p_l] `ilgm nb[n [l_mnliahfs \c[m_ ^
[a[chmn nb_mnlo]nol_ i` chn_l_mn mbiof^ g[e_cn _[mc_l ni ^_n]n _rj_]n[ncih [^ [jn[ncih+ >hinb_l
g_ ^c[nil i` nb_rj_]n_ ^ ``_]n met_cm nb_]f[lens i` nb_ ^cm[g\cao[ncih meah[f+ Qb_f_mm oh]_ln[chns
[\ion nb_]ill_]n mshn[nc] j[lm_]i g j_l_b_h^_lm [l_f`n qcnb [n_l l_l^cha nb_ `clmm qil^ i` nb_
^cm[g\cao[ncih l_acih) nb_ [mc_l cm mbiof^ _ ni ^_n]n []f_l [g\caocns ``_]n+

Fh nbcm]ihm_rn) q_ hin_ [h cgjiln[hn [ms g g_nls _nq_h nb_ _[mc\cfens i` n_mncha]b[ha_m ch
nb_mct_ i` [g\caocns ``_]nm `il J Sm %Ml^c]ncih .& [h^ O@m %Ml^c]ncih /&7 cn gil_mnl[cab`ilq[l^
ni i`n[ch []f_l ^cm[g\cao[ncih meah[f `il O@m) nb[h `il J Sm+ >h^) [m cn nolhm ion) nbcm jli\`f_g
q[m_r[]_l [n_ ^ ch EP.5)]i g j_l_l^_ ni C.0+ >m nbcm gcabn b[p_]ihnl_\on^_ ni EP.5; m `efol_ ni
l_jfc][n_Ml^c]ncih .) q_ f[\il[n_+

Pj_]c`c][ffs) O@]ihcho[ncihm [m ch % . \& jlipc^_]i g j_l_b_h^_lm qcnb [mnliha ^cm[g\cao[ncih
meah[f { [h i`m_lp[ncih i`]ih^o]n_ ^ } `iffiqcha |Qb_ _rj_lcg_h]_ ^ mif^c_lm q[lh_ ^ [\ion nb_
^ [ha_lm y]_mm_hnc[ffs l_kocl_m l_l^_lm ni acp_ oj ih nb_bs jinb_mcm nb[n |q[lh_ ^ } cm nb_ g[nlcr
p_l] %ohf_mm ih_]ihme^_lm]ih^o]n_ ^ } [nsj_i l al[g g[nc][f gcmn[e_&+ Qbcm cm) i`]iolm_)nb_p_ls
l_[mih qbs m_hn_h]_m fce_ % . \& _hdis_ ^ [mn_ff[l] [l_l [m a[l^_h*j[nb_m_hn_h]_m+ @lnc][ffs) J S
]ihcho[ncihm [m ch % . [& ^i Z/` jlipc^_ [h_ko[ffs mnliha ^cm[g\cao[ncih meah[f+ Qb(n cm) _p_h c` q_
cg[ach_ []i g j_l_b_h^_l qbi mnlihaf_s _rj_]nm ni _ ch [h O@ j[lm_ _+a) _] [om_ i` b[pcha _h
rjim^ ni g[hs O@m [h^ hi J Sm&) nb_ ^cm[g\cao[ncih l_acih ch % . [& { chn_h^_ ^ ni ch^c][n_ [h
J S j[lm_ { cm []no[ffs j_l_]nfs]i g j[nc\`f_ qcnb []ihcho^_ O@ chn_ljl_n[ncih7 | _ `il nb_
gc^hcabn l[c^)] [h _ [gi^c`c_l ni nb_hioh jbl[m_ |nb_ ^ [ha_lm] il nb_p_l \ jbl[m_ | q[lh_ ^ [\ion

nb_ ^[ha_lm} _p_h oh^_l nb_ O@ j[lm_+ Qbcm jlij_lns i` JS ^cm[g\cao[ncih; g[e_m cn go]b
b[l^_l ni ^_n] n [g\caocns _`_]nm \il JSm) jlgj[l^_ni O@+>h^ nbcm) ch nolh) g[e_m cn ^c`c]ofn
ni l_fc[\fs_n_mn ML^c]ncih.) qbc]b [l_ [\ion OTMZSQ_ ch nb_mct_ i` [g\caocns _`_]n+ Fh`[]n) nb_
ihfs oh[g\caoio m^cm[g\cao[ncih meah[f cm jlpe^_ ^\s nb_j_lci^ [n nb_ h^ i` nb_m_hn_h]_ %h^
nbom ionmc^_ nb_nbl_*qil^ ^cm[g\cao[ncih l_acih nsjc][ffs _gjfis_ ^ ch mmo^c_m ih nb_ O@, JS
[g\caocns&+ Qbcm jli\ f_g cm hin fcgc_ ^ ni m_hn_h]_ %&+ >ff mnc gofc i` jl_pciom mmo^c_m ih nb_
O@, JS [g\caocns nb[n q_ l_pc_q_ ^ b[p_ nbcm jlij_lns %qbc]b q[m hin]lcnc][f ni nb_ ai[fm i`
mmo^c_m ih nb_ QdU`QZOQ i` a[l^_h j[nbm \on g[nm_lm qb_h q_ n_mn jl^c]ncihm [\ion]b[ha_m ch
a[l^_h j[nb _`_]nm&+ Fh^ _^) cm m_gm ni _ ^c`c]ofn) c` hin c g jimmc\ f_) ni]l_[n mnc gofc nb[n pic^
nbcm [ms g g_nls `il nb_ O@, JS [g\caocns %\on m_ @l[s]l[^n) /- .1) `il c g jlip_g_hnm ip_l nb_
mnc gofc om_ ^ ch _[lfc_l mmo^c_m&+

Fn cm jlcg [lfcfs ^o_ ni []ig\ch[ncih i` [mj_]c`c] jlij_lns i` nb_m_f*j[]_ ^l_ ^cha j[l^ca g
gjfis ^ \s C.0 [m q_ff [m [mj_]c`c] jlij_lns i` nb_cl mnc gofc nb[n MZe meah[f`il ML^c]ncih . cm
rj]n_ ^ [n [ff ^olcha nb_nbl_*qil^ ^cm[g\cao[ncih l_acih+ Qb_ gipcha*qch^iq qil^*\s*qil^
m_f*j[]_ ^l_ ^cha C.0 _gjfis_ ^ g[me_ ^ [ff qil^m \inb NOR/^Q [h^ [n_l nb_s q_l_mbiqh+>m cm
]ig gih`il nbcm j[l^ca g) qil^m q_l_g [me_ ^ qcnb |*] [h^mj[]_ m \nq_h nb_ qil^m q_l_pcmc\ f_
ni l_ ^_lm+ Qbcm g_[hm nb[n j[lnc]cj[hnm ehq biq g[hs qil^m [l_s_n ni _ l_p_ f^ _\`il nb_
m_hn_h]_ _h^m+>h^)]lcnc][ffs) nb_ O@ [h^ JS mnc gofc ch C.0; m_rj_lcg_hn [ff b[^_r]nfs `iol
qil^m l_g [chcha ch nb_m_hn_h]_ mn[lcha [n nb_ `clmn qil^ i` nb_ ^cm[g\cao[ncih l_acih %m ch %&7
| y]ih^o]n_ ^, _il nb_ g^hcabn l[c^]&+ Pch]_ [bsjinb_nc][f mnliahfs O@*\c[m_ ^]ig jl_b_h^_l
qbi _rj_]nm nb_m_hn_h]_ ihm_n |Qb_ _rj_lcg_hn ^ mif^c_lm q[lh_ ^ [\ion nb_ ^[ha_lm y } ni b[p_
[h O@ j[lm_mneff l_koel_m [g[nler p_l] \`il [q_ff*ilg_ ^ m_hn_h]_) nbcm g_[hm nb[n _]b i` nb_
l_g [chcha `iol qil^m `olnb_l ch]l_[m_m nb_ jli\ [\cfns nb[n nb_m_ko_h]_ m i` qil^m m_h mi `l gonn
_ chn_ljl_n_ ^ [m [h JS+ Qbcm cm mcgcf[l ni nb_]m_ i` mjie_h f[hao[a_oh^_lm[h^cha) qb_l_
jlimi^c] ch`ilg[ncih] [h _ om_ ^ ni [hnc]cj[n_]f[om_ il m_hn_h]_ \ioh^ [lc_m+ Qb_ ` [n nb[n C.0
[hfst_ ^ nb_ `clmn nbl_ i` nb_m_ `iol qil^m %`iffiqcha _[lfc_l a[l^_h*j[nb _rj_lcg_hnm ih nb_
O@, JS [g\caocns J]Aih[f^ _n [f+] .661& cm nbom fce_fs ni b[p_ acp_h nb_g [\ion [m go]b
mn[nemnc][f jiq_l [m jimmc\ f_ ch ^_n]ncha [h [g\caocns _`_]n+¹²

EP.5 _gjfis nb_m [g_ qil^*\s*qil^ gipcha qch^iq g[me_ ^ jli]_ ^ol_+ Qb_cl mnc gofc)
biq_p_l) ^c^ hin mb[l_ nb_m]ih^ jlij_lns i` C.0; m_rj_lcg_hn7 []limm [g\caoio m JS mnc gofc)
_nq_h0*5 qil^m `iffiq_ ^ nb_l_acih chn_h^ ^ ni _ [g\caoio m %g_[h : 1+6) PA : .+158]^+ g_[h
: 1) PA : - `il C.0&+ P_p_h %04#& i` nb_ .6 JSm ch EP.5 % . q[m l_gip_ ^ \s EP.5 `il inb_l
l_[mihm& b[^ gil_nb[h l qil^m `iffiqcha nb_ [g\caoio m l_acih+>^ ^cncih[ffs) ih_ %2#& i` nb_
[g\caoio m JSm b[^ ihfs 0 qil^m `iffiqcha nb_ [g\caoio m l_acih) qbc]b g_[hn nb[n nb_f[la_
m_hn_h]_ *ch[f l_ ^cha nc_g_ch]l_[m_m q_l_j [ln i` nb_ ^cm[g\cao[ncih l_acih+ Fh mbi ln) 5 ion i` nb_
.- [^ ^cncih[f JSm ^ meah_ ^ \s EP.5 b[^ jlij_lnc_m nb[n g[^_cn b[l^ il c g jimmc\ f_ ni ^_n]n [h
[g\caocns _`_]n ih nb_g+¹³ Qb_ nlo_ mn[nemnc][f jiq_l i` EP.5; m_rj_lcg_hn qcnb l_a[l^_ni
ML^c]ncih . cm nbom fce_fs ni _ mo\mn[hnc][ffs fi q_l nb[h moaa_mn_ ^ \s nb_cl jiq_l [h[fs mcm+ M_lb[jm
gimm c g jiln[h cm nb[n ^ meah]b[ha_m fce_ nbcm] [h []no[ffs l^o]_ nb_jl^c]n_ ^ _`_]n mct_ p_h
]igj[l^_ni nb_ ilcach[f _rj_lcg_hn qcnb b[f^ [m g[hs cn_gm+ @ihmc^_l) `il nb_m[e_ i` nbcm

¹¹ Qbcm _]ig_m [jj[l_hn c` q_]ihmc^_l [h oh[g\caoio m O@ p_lmcih i` nb_m_hn_h]_ ch %&7 |Qb_
_rj_lcg_hn] ^ mif^c_lm qbi q_l_q [lh_ ^ [\ion nb_ ^[ha_lm _il nb_ g^hcabn l[c^ y]+ Qbcm m_hn_h]_] [h _
]ig jf_n_ ^ qbcf_ f[pcha nb_ O@ chn_ljl_n[ncih chn[n %] y]ih^o]n_ ^ [hinb_l l[c^+]&+

¹² T_hin_nb[n ch]fomeih i` nb_ `iolnb [h^ `ch[f qil^ cm hin h_]mm[lfcfs _rj_]n_ ^ ni `olnb_l ch]l_[m_nb_
mn[nemnc][f jiq_l ni ^_n]n [h _`_]n7 m_f*j[]_ ^l_ ^cha _rbc\cnm p_ls f[la_ch]l_[m_m ch l_ ^cha nc_g_m [n nb_
h^ i` nb_m_hn_h]_ m %Hoj_l g[h _n [f+] /- .-&] [m [fmi_pe^_h]_ ^ ch C.0; m_rj_lcg_hnm %Ch_ _n [f+] /- .0) Ccaol_
l&+ P_f*j[]_ ^l_ ^cha _rj_lcg_hnm n_h^ ni _ chn_hncih[ffs ^ meah_ ^ mo]b nb[n]lcnc][f l_acihm ^i hin chpifp_
nb_ f[mn qil^] [m q[m [fmi nb_] [m_ `il Cch_ _n [f+ %/- .0&+

¹³ >^ ^cncih[ffs) q_ `ioh^ nb[n qil^m]ihmncnoncha nb_nbl_*qil^ ^cm[g\cao[ncih l_acih ^c`_l_ ^ cU`TUZ&
cn_g `il [n f_[mn nbl_ %02#& i` nb_ .- h_q JS cn_gm ch EP.5 %Fn_g .25) .3-) .31&+ Qb_ `ch[f l_acih ^c`_l_ ^
ch nb_m_cn_gm] [h^ ch ih_ [^ ^cncih[f cn_gm %Fn_g .4.&+ Fh [ff] [m_m]_]b i` nb_nqi ^c`_l_hn p_lmcihm i` _]b
cn_g q_l_m_h \s [jjli reg[n_fs_ko[ffs g[hs j[lnc]cj[hnm+ T_]ig gohc[n_ ^ nb_m_jli\ f_gm ni EP.5 [h^
nb_l_pcm_ ^ ^ [n [h^m]lcjnm ih nb_cl LPC mcn_hi q_r]fo^_ nb_m_cn_gm+

[laog_hn) nb[n nb_ 5 jli \f_g [nc] J S m b[^ hi ^ _n] n [\f_ [g \caocns _ `` _n] [h ^ nb_ l_g [chcha . / J S m b[^ nb_ j_l ^ c] n ^ [g \caocns _ `` _n] [h ^ nbom [j_l ^ c] n ^ \ _n q _ h * alioj ^ c `` _l_h] _ ch nb_ j_l ^ c] n ^ moljlc m [f i ` + 0 / 3 \ c m % f _ n * g i m n j [h _ f ch Ccaol _ . 0 * ? & + Qbcm q i o f ^ f _ [p _ l - # ` _ q _ l c n _ g m n i ^ _ n _] n nb_ j_l ^ c] n ^ \ _n q _ h * alioj ^ c `` _l_h] _ ch J S moljlc m [f +

Fh mbi ln) m_p_l f jlij_lnc_m i` nb_ O@, J S [g \caocns gcabn fc gen l_m _ [l] b_l m; [\cfens ni ^ _n] n _rj _] n [ncih [^ [j n [ncih ih J S m % m _ [f m i Ccaol _ . / ch nb_ g [ch n _ r n & + Conol _ m n o ^ c _ m i h _ r j _] n [ncih [^ [j n [ncih gcabn] ihmc ^ _ l [f n _ l h [ncp _ a [l ^ _ h j [nb mnlo] nol_m qcnb] f _ [l _ l ^ cm [g \cao [ncih jichnm +

/ %) - BBGQGLK ? I D ? A Q L O P Q F ? Q ? O C M O C B G A Q C B Q L ? D D C A Q Q F C P M C C B L D C U M C A Q ? Q G L K ? B ? M Q ? Q G L K

T _ \lc _ fs cffomnl [n _ n q i [m j _] n m nb [n gcabn [`` _] n nb _ ^ _ al _ ni qbc] b _ r j _] n [ncih [^ [j n [ncih cm i \ m _ lp _ ^ ch [h _ r j _ lc _ g _ hn) nb [n [l _ hin] [j nol _ ^ \ s nb _ mc g j f _ \ _ fc _ ` * o j ^ [ncha g i ^ _ f q _ b [p _ _ g j f i s _ ^ b _ l _ +

Qb _ ` c l m n j i c h n] i h] _ l h m nb _ ch n _ l j l _ n [ncih i ` G > \ ip _ q _ b [p _ m i g _ nc _ g _ m l _ ` _ l l ^ ni C [m nb _ m n l _ h a n b i ` j l c i l \ _ fc _ ` m + Qbcm ` i f f i q m nb _ g i m n j i g g i h h i g _ h] f [n o l _ ` i l n b c m n s j _ i ` j [l [g _ n _ l \ o n c m j i n _ h n c [f f s] i h ` o m c h a + O (n b _ l) q _ j l i j i m _ n b [n C] [j n o l _ m b i q ^ Q X Q b M Z `] i g j l _ b _ h ^ _ l m n [e _ j l _ p c i o m _ r j _ l c _ h] _ n i \ _ n i n b _ j o l l _ h n _ h p c l i h g _ h n + Qbcm j _ l m j _] ncp _ b c a b f c a b n m n b [n n b _ l _ f _ p [h] _ i ` j l c i l _ r j _] n [ncih m n i _ r j _] n [ncih m ` i l n b _ j l _ m _ h n _ h p c l i h g _ h n { i l _ p _ h n b _ l _ f _ p [h] _ i ` _ / Y Q j l c i l _ r j _] n [ncih m \ [m _ ^ i h _ \ Q O U R U O j l _ p c i o m _ r j _ l c _ h] _ n b [n c m] i h m c ^ _ l _ ^ m c g c f [l n i n b _ j l _ m _ h n _ h p c l i h g _ h n { c m m _ f _ h _ ^ m n i \ _ ch ` _ l l _ ^ + C i l _ r [g j f _) c `] i g j l _ b _ h ^ _ l m [l _] [j [\ f _ i ` f _ [l h c h a _ h p c l i h g _ h n * m j _] c ` c] _ r j _] n [ncih m [h ^ l _ g _ g \ _ l c h a n b _ g] [` o f f g i ^ _ f i ` _ r j _] n [ncih [^ [j n [ncih gcabn l _ k o e l _ ch ` _ l _ h] _ m [\ i o n l _ f _ p [h n m c g c f [l _ r j _ l c _ h] _ m +

> ^ ^ c n c i h [f f s] [^ [j n [ncih n i [h _ q o h ` [g c f c [l _ h p c l i h g _ h n % m o] b [m [h _ r j _ l c _ g _ h n & gcabn \ _ ` [m n _ l c h n b _ j l _ m _ h] _ i ` [^ ^ c n c i h [f] o _ m n b [n j l c i l _ r j _] n [ncih m gcabn h i n n l [h m ` _ l n i n b c m _ h p c l i h g _ h n %] + q i h e s q i l f ^ _ r j _ l c _ g _ h n m i l [l n c ` c] c f f [h a o [a _ f _ [l h c h a & + @ i h p _ l m _ f s] n b _ g i l _ f c e _ f s n b _ j o l l _ h n _ h p c l i h g _ h n c m n i \ _ ch ` _ l l _ ^ n i ` i f f i q j l c i l _ r j _] n [ncih m) n b _ g i l _ r j _] n [ncih [^ [j n [ncih m b i o f ^ \ _] i h m n l [c h _ ^ \ s n b i m _ j l c i l _ r j _] n [ncih m + F h ^ _ ^) n b _ l _ c m [\ o h ^ [h n _ p c ^ _ h] _ n b [n m i g _ _ r j _] n [ncih m [l _ p _ l s b [l ^ i l c g j i m m c \ f _ n i i p _ l] i g _ _ p _ h q c n b j l i f i h a ^ _ r j i m o l _ % _ a +) m _] i h ^ f [h a o [a _ [] k o c m c n c i h c h [^ o f m] [m l _] h n f s l _ p c _ q _ ^ c h M [d [e] C c h _] H f _ c h m] b g c ^ n) \$ G [_ a _ l] / - . 3 & + T b c f _ f c g e n [n c i h m i ` n b c m n s j _ [l _ i ` n _ h [n n l c \ o n _ ^ n i] i a h e n c p _ f c g e n [n c i h m) c m c m q i l n b j i c h n c h a i o n n b [n c n] [h \ _ l [n c i h [f n i h i n [^ [j n n i k o c] e f s { [p i c ^ c h a l _ ^ o] _ ^ ` ` c] c _ h] s ^ o _ n i p i f [n c f _ _ r j _] n [ncih m n b [n g e m g [n] b n b _ m n [n e m n c] m i ` n b _ c h j o n + O [n c i h [f [^ [j n [ncih m b i o f ^ c m m _ f _ l _ f s i h j l c i l e h i q f ^ a _ [\ i o n n b _ p i f [n c f e n s i ` n b _ l _ f _ p [h n m n [n e m n c] m [h ^ n b _ `] [n i l m n b [n j l _ ^ c] n] b [h a _ m c h n b i m _ m n [n e m n c] m % ` i l l _ f _ p [h n ^ c m] o m m c i h) m _ H f _ c h m] b g c ^ n) \$ G [_ a _ l] / - . 2 8 N c [h] G [_ a _ l] \$ > m f c h) / - . / 8 V o [h ^ @ i b _ h] / - - 5 & +

Conol _ j i g j [l c m i h m i ` \ _ m n * ^ c n c h a C n [] l i m m ^ c `` _ l _ h n n s j _ m m s h n [] n c] m n l o] n o l _ m m b i o f ^ n b o m n [e _ c h n i []] i o h n n b [n _ r j _] n [ncih [^ [j n [ncih gcabn \ _ g i l _ l [j c ^ ` i l m n [n e m n c] m ` i l q b c] b j i g j l _ b _ h ^ _ l m ; j l _ p c i o m _ r j _ l c _ h] _ m o a a _ m m n b [n n b _ s p [l s [] l i m m f c h a o c m n c] _ h p c l i h g _ h n m % O B C & + C i l _ r [g j f _) c ` n b _ ` l _ k o _ h] s i ` j [m m c p _ m n l o] n o l _ m p [l c _ m m n l i h a f s \ _ n q _ _ h _ h p c l i h g _ h n m \ o n n b _ ` l _ k o _ h] s i ` ^ c `` _ l _ h n ^ c n l [h m c n p _ m n l o] n o l _ m ^ i _ m h i n) [^ [j n [ncih n i] b [h a _ m c h j [m m c p _ ` l _ k o _ h] s m b i o f ^ \ _ ` [m n _ l +