

'UXJ 8VH DQG 6SDWLDO '\QDPLFV RI +RXVHKROG

(ORLVH 'XQODS (PPD - %URZQ

1DWLRQDO 'HYHORSPHQW DQG 5HVHDFK ,QVWLWXWH 1HZ <RUN 86\$

6RXWK ODULRQ \$YHQXH /DNH &LW\ )ORULGD 86\$

&RUUHVSRLQLQJ DDXWKROXQDS 1DWLRQDO 'HYHORSPHQW DQG 5HVHDFK ,QVWLWXWHV ,QF :HVW )D[ (PPD QDS#QGUL RUJ

5HFHLYHG)EWH \$FFHSWHG\$SDWH 3XEOLVKHG\$SDWH

&RSULJKW 'XQODS ( HW DO 7KLV LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XQGHU WKH WHUPV RI XVH GLVWULEXWLRQ DQG UHSURGXFWRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO DDXWKROG DQG VRXU

\$EUVUDFW

WKHLU FKLOGUHQ > @ 6RPH OLWH

SDUHQWVd DQG WKHLU SDUHQWVd

+RXVHKROG VSDFH DOORFDWLRQ E\ ZRPHQW D KHG X R H V W K H K D X U P R O W K H L K L Q U G H P R Q V W U D W H W K H F R P S O H [ F K D U D F W H U R I K R X V H K R O G V S D F H D Q G V R F L D O U H C G U X J F R Q V X P S W L R Q W K U R X J K W K H D O O R F D W L R Q V S D F H L Q W K H K R X V H K R O G I R U C X V H Z L W K L Q W K H L U K R X V H K R O G V D Q G W K H L P S D F W R I W K L V R Q W K H K R X V H K R O G D D Q G S U H Y H Q W L R Q R V V S

6XFK IDFWRUV DUH FULWLFDO ZK

2EMHFVWKHXVH RI KRXVHKROG VSDFH KDV FORW D E W H Q D Z L W K V G U X W R E L D S H Q G H Q W E H H Q X V H G E \ G H F R U D W L R Q O L W H U D W X U H W R W S K F L G U X S D F H X G F X O L Q D N S H R O G H R Q Y K R X V H K R O G V S D F H D P R Q J G U X J I R F X V H G K R G V L H R P H G S D O W S R A Q S W K E Q L Q R N W W R W K H L U F K L O G U H Q W K U R X J K F R Q W U R O O L Q X J R H V W K R S D U H Q D W D D O O R F D W L R Q

KRXVHKROG RXW RR WISHDQJ RWKH

0HWKRQWD SUHVHQWHG FRPHV IURP WZR D V X L Q H P H E H R U N P D Q G S O R V H Q W 7 F S D U W L F L S D Q W V L Q I D P L O L H V I U R P 1 H Z < R U N D Q G S D U W L F L S D Q W V I R U G U X J L Q D Q H W K Q R J U D S K L F P H W K R G R O R \ I R F X V L Q J R Q D Y D U L H V W R E H K R Y L R U S D W W H U Q D E X V L Q J K R X V H K R O G V 5 H S H D W H G L Q W H U Y L R Z V W K L R E V H U Y D W L R Q V W R R N S O D F H W L P H V D Q G G D I V R I W K H Z H H N ) O R U L G D V W X G \ Z D V F R Q G X F W H G R Y H U D \ H D U S H U L R G

5HVXOWWD LQ XHWKDW PRGHOLQJ RI GUXJ XVH PDI KDYH RQ 5HVVW D W X J J H W S D U H Q W V D W W H P S W H G W R F R Q F H D O W K H L U G U X J X V H I U V W U D W H J L H V O H Q W D O V R F L D O D Q G S K \ V L F D O Z H U H W L H G W R J H W K H U L Q V S D F H I P H D Q L Q J D Q G D U R V H I U R P X V H S U D F W L F H

- \$GGLFMU5HV 661 &RQFOXVQRQJEDQ DQG UXUDO VHWWLQJ V D S D W W H U Q R I K R X V H K R O G X P H R K D M H P H U J L Q J \$ O W K R X J K G U X J F R Q V X P S W L R Q L V V W L O O S U R P L Q H Q W L W L V Q R W D O Z R P H Q Z K R X V H G U X J V 7 K H V H Z R P H Q P D I K D Y H O H D U Q H G W R L Q W H J U D W H W K H L U

UXJ FRQVXPSWLRQ

VHW DQG VHWWLQJ LV YHU\ LPSRUWDQW ZKHQ ORRNLQJ DW WKH

LQ ZKLFK LOOLFLW GUXJ FRQVXPSWLRQ RFFXUV > @ 0RWKHUV

UXJ FRQVXPSWLRQ EHKDYLRU SDWWHUQV DUH SDUWLFXODUO\

Q WKH

Theoretical 7HQHWV

H

RSSRUWXQLW\ WR KH DU WKH XWWHUDQFHV RI PRGHOV LW ZRXOG EH YLUWXDO  
LPSRVVLEOH WR WHDFK WKHP WKH OLQJXLVWLF VNLOOV WKDW FRQVWLWXWH  
ODQJXDJHg

0HWKRG

'DWD SUHVHQWHG FRPHV IURP WZR HWKQRJUDSKLF VWXGLHV HQWLWOHG f&R  
2FFXUULQJ 'UXJ 8VH 9LROHQFH DQG %HKDYLRU 3DWWHUQVg 1HZ <RUN DQG  
f\$Q (WKQRJUDSK\ 'UXJ 8VH DPRQJ \$IULFDQ \$PHULFDQ :RPHQ LQ  
5XUDO 1RUWK YORULGHV g LQYROYHG D WRWDO RI SDUWLFLSDQWV LQ  
IDPLOLHV IURP LQQHU FLW\ 1HZ <RUN DQG SDUWLFLSDQWV LQ IDPLOLHV

WKH DOORFDWLRQ RI KRXVHKROG VSDFH



WU\LQJ WR UHVWULFW KHU VRQ WR WKH RQH URRP WR ORRN DW 79 VR VKH UHVR  
WR XVLQJ GUXJV RXWVLGH RI WKH KRXVHKROG RU ZKHQ WKH FKLOGUHQ ZHUH QR  
DW KRPH

6XFK IDFWRUV DUH FULWLFDO ZKHQ DWWHPSWLQJ WR XQGHUVWDQG ZK\ DOO  
FKLOGUHQ ZLWK GUXJ GHSHQGHQW SDUHQWV GR QRW XVH GUXJV RU SDUWLFLSD  
LQ WKH GUXJ VXEFXOWXUH 'XQODS H[DPLQLQJ WKH KRXVHKROGV RI ZRPHQ  
ZKR FRQVXPHG FUDFN IRXQG WKDW FRQVXPSWLRQ EHKDYLRU ZDV QRW  
SDVVLYHO\ REVHUYHG ,W ZDV ~~QRW~~ SDVVLYH UHFHSWLYH SURFHVV  
JUHDW GHDO RI HPRWLRQDO DQG SV\FKRORJLFDO WUDXPD WKDW WRRN SODFH >  
&KLOGUHQ ZKLOH JURZLQJ XS DQG REVHUYLQJ WKHLU PRWKHU FRQVXPH  
FUDFN XSRQ EHRPLQJ WHHQDJHUM\WKH\ WRR EHJDQ WR XVH GUXJV  
KRZHYHU ~~PRVW~~ DQRWKHU GUXJ RI FKRLFH L H EOXQWV > @

LVPDQXVFULSW LQGLFDWHV ZLWKLQ ERWK XUEDQ DQG UXUDO VHWWLQJV WKH  
EHJLQQLQJ RI D SDWWHUQ RI KRXVHKROG GUXJ FRQVXPSWLRQ LV HPHUJLQJ