J?@. 9 G/EY Bh 15 2s EE5$9) 3XNX9V H/I=MQ;qNA

!V%7%g%C%H J,N`$K4p$E$/1GA|%G!<%?%Y!<%9$X$N<+F0E*:w0zI

Gn;N2]Dx 2 G/ 0f<j 0İO:[*]

J?@. 9 G/ 10 7n 17 F|

1 O8aK

KhF|MM!9JG^BNrDL8F2f!9$KDs6!$5lk%^%k%A%a%G%#%"!"FC$K2hA|>pJs$NA}2C$KH<$$!"$=$liN:FMxMQ$d8!:w$rMF0WK9k?aN<+F0E*$J:w0zIU$1$NI,MW@-$,9b$^$C$F$$$k!#

=>Mh!"2hA|>pJsXN:w0zIU1O!"7W;;5!Kh$k2hA|FbMF$NM}2r$,Hs>o$K:FqG;~4VrMW9k?$a<jF0$G9TollF$$$?>e$K!"$=$N7k2LBg;(GD$JbNKJi6krF@J+C?!#6aG/!"3liN9bEY$J2hA|=hM}$K5/0x9k:Fqr2sHr7F!"<+A38@8l=hM}$HHf3SE*4JC1$J2hA|=hM}$rE}9g$7$?<+F0E*$J:w0zIU1N<jK!$K4X$9$k8&5f$,9Tol;OaF$$$k!#

K\8&5fb3Nh$&$JN.lr5b$_!"%7%g%C%H (2hA|E*$KO"B3$JF02hA|$N:G>.C10L) $NJ,N`$K4p$E$-!"J,N`Kh$KE,@Z$J%-!<%o!<%I$rA*BrE*$KIUM?$7!"2hA|FbMF$K1~$8$?:w0zIU$1$r;n$_$k!#$^$?!"$3N3HO!"4{B8$N<jK!$G$O:$Fq$@$C$?!"%7%g%C%H$H$$$&;~4VE*$KC;$$C10LXN:w0zIU1bF1;~$K<B8=$9$k!#

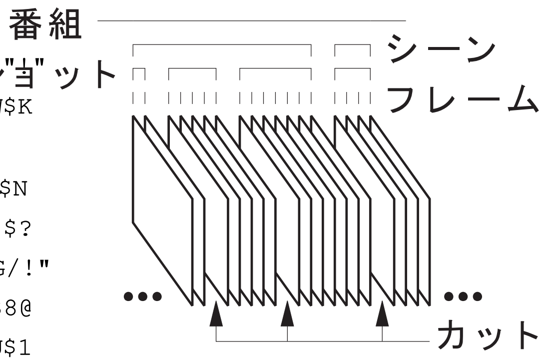
8=;~E@GO%-!<%o!<%I$NCj=P8;$H7F!";zKk$H$$$&85!9%-!<%o!<%IE*MWAG$NG;$$>pJs$rMxMQ$9$k!#$^$?!":w0zIU$1$r9T$&3H$NI,MW@-$H!";zKk$NMxMQ$N7d$9$5$NE@$G!"%K%e!<%9HVAH$rBP>]$H9k!#

K\H/I=GO!"3Nh&$J%7%g%C%HJ,N`$K4pE/<+F0E*:w0zIU$15!9=$NDs0F$r9T$$!"8D!9$NMWAG5;=Q$*hS>pJsE}9g5!9=$r<B:]$N%K%e!<%9HVAHKE,MQ7$?7k2L$r<($7!":G8e$K!#8e$N2]Bj$r8!F$$9$k!#

1.1 MQ8l$NDj5A

F02hA|$K4XO"$9$kMQ8l$NDj5A$OHf3SE*[#Kf$J$?$a!"0J2<$KK\H/I=$GMQ$$$kMQ8l$NDj5A$r9T$&!#

?^ 1$K<($9h&$K!"HVAH$O%7!<%s$N=89g!"%7!<%s$OO"B3$7$?N`;w%7%g%C%H$N=89g!"%7%g%C%H$O%+%C%H$G6h@Z$i$l$?2hA|E*$KO"B3$J%U%l!<%`$N=89g$+$i!"3,AXE*$K9=@.5l$k!#%U%l!<%`$O@E;_2hA|$G$"$j!"F|K\$J$I$G:NMQ$5$l$F$$$k NTSC J}<0$N>l9g$O!"KhIC 30 %U%l!<%` (frames per second=fps) $,<($9$KI=<($5lk3HKh$j!"5?;wE*$KF0$-$r:F8=7F$$$k!#



?^ 1: F02hA|$N3,AXE*9=@.

2 4XO"8&5f

%^%k%A%a%G%#%">pJsKBP9$k:w0zIU$1<jK!KO!"

1. 2hA|E*FCD'Kh$k:w0zIU$1

2. 8@8l (%-!<%o!<%IJI) Kh$k:w0zIU$1

$,$"$k!#A0<T$O!"9G$K8!:w<T$N<j85$dG>N"$K8!:w7A|$KN`;w$7$?2hA|$,$"$kH-$KE,$7$F$$$k$,!"?MJ*$JE*$J8@MU$d35G0Kh$j8!:w$7$?$$$H$-$KOE,5J$$!#KGO!"%K%e!<%9%G!<%?%Y!<%9$r07$&NKE,7F$$$k$H9$l$k8e<T$r:NMQ9k!#

0lJ}!"$=$b$=$b:w0zIU1r9To:!"A4J88!:wNh$&$;~$K2;@<$d;zKkNCf+$iLd$$9go;$H0lCW$9$k2U=j$rD$k<jK! [Brown95] b"$k!#7+$7!"3N<jK!GO2;@<dH<B:]$N2hA|FbMF$NBP1~$,I,$:7bJ]>Z5l$J$$$H$$$J7gE@$,$"$k!#

0J2<$K!"8@8l$Khk:w0zIU$1<jK!$r 3 DKJ,N`7F9k!#

2.1 <jF0Kh$k<jK!

:G$b8EE5E*$J<jK!$O!"<jF0$KhkbNG"$k!#<B:]!%S6I$N;qNA1GA|4IM}$O!"1GA|:n@.<T (%G%#%l%/%?, %+%a%i

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[*] 3X@RHV9f 67108, EDCf (1Q) 8&5f<<, ide@mtl.t.u-tokyo.ac.jp

$N%a%b$dBfK\$K4p$E$$$F:w0zIU$1$7$?$bNrMxMQ7F1$$F02hA

7+$7!"$3Nh$&$J<jK!GO!"GzH/E*$KA}2C$9$k1GA|>pJs

$r:FMxMQ$7$?$j8!:w7?j9kN$K==J,$J!"$-$a:Y$+$J:w0z

IU1r9T$&$3H,!"<AE*KbNLE*KbIT2DG=KJjDD"$k!#

3NLdBj$KBP=h$7DD$b<jF0$Khk:w0zIU1r9T$&<jK!$H

7F!":w0zIU1N$?$a$N%f!<%6%$%s%?%U%'%9$N8&5f [Zhang95]

$d!"%M%C%H%o!<%/$r2p7? Q&A <0$N>pJs<}=8$Khk:w0zIU

1r9T$&%7%9%F%` [:4F# 96] JI$,$"$k!#

2.2 E}7WE*<jK!

<jF0Kh$k:w0zIU$1$N8B3&$r9nI~9k$?$a$KMM!9$J<+F02=

<jK!$,8!F$$5lF$$$k!#$=$NCfGbHf3SE*C1=c$G!"8N$K:G$b

@.8y7F$$$kN,!"2;@<Cf$N8l$N=P8=IQEY$r:w0zIU$1$KMxMQ

7?E}7WE*<jK!G"$k!#

BeI=E*JbNH7F!"Informedia [Smith97] [Wactlar96]

[Hauptmann95] [Informedia] $,5s$2il$k!#2<<0$K4p$E$$$F

7W;;7? TF-IDF $H8F$PlkI>2A4X?tKh$j!"=P8=$9$k8l$

$N!VDA$7$5!W$rI>2A7F!"DA$7$$$bNr%-!<%o!<%IH7$FMQ

$$$k!#

$$f_{TF-IDF}(word) = \frac{p_s(word)}{p_c(word)} \qquad (1)$$

$3$3$G!"$p_s(word)$ O"$k6h4V$NC18l $word$ $N=P8=IQEY!"

$p_c(word)$ $O0lHLE*$JBg5,LO$J%3!<%Q%9 (J8>O$N=89g) Cf$N

$=$N8l$N=P8=IQEY$H9k!#

Informedia O9GK<BMQ%l%Y%k$KC#$7$F$$$k$,!"IQEY>pJs

$rF@$kNK==J,JNLN<+A38@8l>pJs$r2r@O$7J1lPJi$:!"

%7!<%sJI$"$kDxEYD9$$6h4VXN:w0zIU1rM>57J/5l$k!#

3N$?$a3N<jK!Gb!"%-!<%o!<%I$H2hA|FbMF$N0lCW$,J]>Z

5l$J$$$H$$$&7gE@$,$"$k!#

2.3 IU2C>pJs$rMxMQ$9$k<jK!

;zKk$r ($=N^$^!"$"$k$$$O2C9)7F) EP>l7?%7%g%C%H$d

%7!<%s$N%-!<%o!<%I$K9k<jK! [;3K\ 96] b"$k!#E}7WE*<jK!

$H3S$YlPOk$+$K$^$7GO$"$k$,!"%-!<%o!<%I$H2hA|FbMF

$N0lCW$,J]>Z5l$J$$$H$$$&7gE@$O0MA3;D$k!#

K\8&5f$N<jK!$O3NJ,N`$KB0$9kbNN!"%-!<%o!<%I$H2h

A|FbMF$N0lCW$rJ]>Z9k3H$rL\;X$7$F$$$k!#

3 %7%g%C%HJ,N`$K4p$E$/:w0zIU$1

K\8&5f$NA4BNA|$r?^ 2$K<($9HHbK!"2<@a$G2hA|=hM}!&

<+A38@8l=hM}!&E}9g=hM}$N3F!9$NN.lK1hCF?^$N@bL@$r4J

C1$K9T$&!#

3.1 2hA|=hM}

2hA|=hM}$NN.$l$O0J2<$NDLjG$"$k!#

1. F02hA|%G%#%8%?%k2=

7W;;5!>e$GF02hA|$r=hM}9k$?$a$K!"%"%J%m%02hA|$r%G

$8%?%k2hA|$XJQ49$9$k!#$=$N7k2L!"F02hA|$O%U%l!<%`

NJBSH7$F07$olk!#

FPl$k@E;_2hA|$N=89g$KJQ49$5lk!#

2. %+%C%H8!=P

%+%C%H8!=P$O!":w0zIU$1$d8!:w$N:]$N:G>.C10L$G$"$

%7%g%C%H$r8!=P$9k?aK9TJ&!#

3. 2hA|E*FCD'NLCj=P

%7%g%C%HJ,N`$r9T$&:]$KMQ$$$k2hA|E*FCD'NL$rCj=P$9$

4. %7%g%C%HJ,N`

F~NO2hA|$r!"2hA|E*FCD'NL$K1~8F!"2?<oN`$+$NE57?

$J%7%g%C%H$N$$$:l+$KJ,N`$9$k!#

3lHOJL$K!"%-!<%o!<%I$N8uJdH9k?aK!"2hA|Cf

$N;zKk$rCj=P9kI,MW$,$"k,!"4{B8$N OCR (8w3XE*J8;zG

lF5;=Q$rMxMQ$9k3HrA0DsK7$F!";zKk$OCj=PG-$?

NH7F07$&!#

3.2 <+A38@8l=hM}

1. 7ABVAG2r@O

F~NO5l$k<+A38@8l$r!"0UL#$r;}$D:G>.$N8@8lC10L$G$

$k7ABVAG$KJ,2r$7!"3F!9$N8@8l3XE*B0@-$rF@$k!#$3$3$

$NL\E*$O!"8GM-L>;l$d0UL#B0@-2r@O$KI,MWKJ$kL>;l

$NKvHx$NL>;l$r@5$7$/@Z$j=P$9$3HK$"$k!#

2. 0UL#B0@-2r@O

;zKk (B?$/$N>l9gL>;l6g) $NKvHx$KB8:_9kL>;lKh$

$F!"$=$NL>;l6g$N0UL#B0@-$r2r@O$9$k!#

3.3 =hM}7k2L$NE}9g

%7%g%C%HJ,N`Kh$K!"E,$7$?0UL#B0@-$rbD%-!<%o!<%I$N

0zIU1r9T$&!#

4 2hA|=hM}

K\>OGO!"8DJL$N2hA|=hM}$K:NMQ7F$$$k<jK!$N>R2p!"

hS<B:]$NHVAH$XE,MQ7?7k2L$r<($9!#

4.1 F02hA|%G%#%8%?%k2=

I= 1$K<($9h&$J>r7o$G%K%e!<%9HVAH$N%G%#%8%?%k2=$r9T

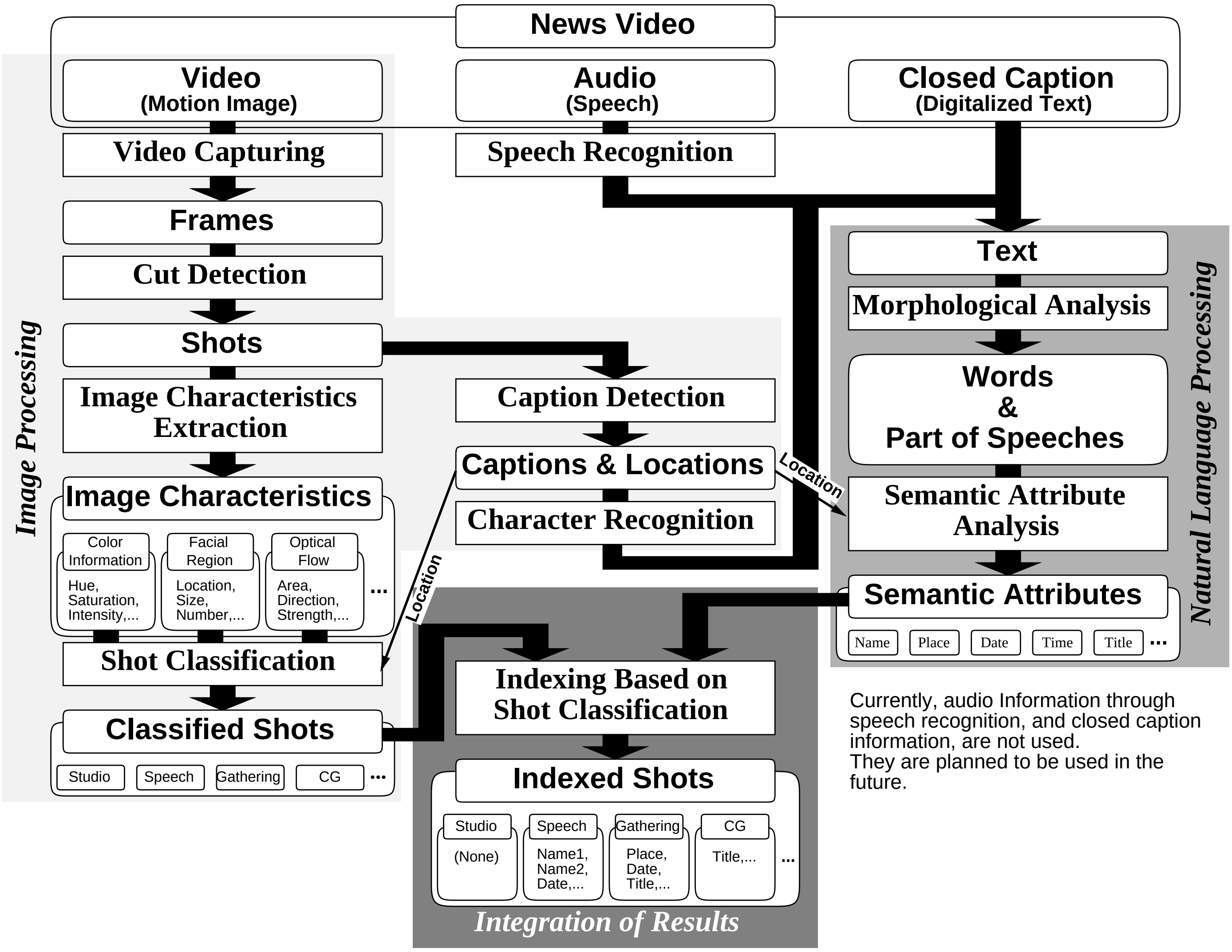
$?!#<B:]$NF|K\$NJ|Aw5,3J (NTSC J}<0) GO 30fps $GJ|Aw

5l$F$$$k$,!"K\8&5f$G9T$&=hM}$G07$&$K$OI8K\2=%l!<%H

5fps $G==J,$G$"$k$HH=CG$7$?!#NHK $N8a8e 9 ;~$NDj;~%K%e!<

%9$rMQ$$$?NO!"=EMW$J%K%e!<%9$,2aITB-J/<}O?5l$F

k3HH!"%3%^!<%7%c%kKh$kCfCG$,$J$$$3HKhk!#



?^ 2: %7%g%C%HJ,N`$K4p$E$/:w0zIU$1<jK!$NA4BNA|

%S%G%*%-%c%W%A%c%\!<%I	SUN Video Card
%U%l!<%`%5%$%:	2# 320 × =D 240 %I%C%H
?'?t	16,777,216 ?' (24bit)
J]B87A<0	UYVY[SunVideo]
I8K\2=%l!<%H	5 fps
HVAHL>	NHK News9
J|AwF|	1997 G/ 1 7n 9 F|
HVAHD9	30 J,
%U%l!<%`?t	8,930 %U%l!<%`
%7%g%C%H?t	211 %7%g%C%H

I= 1: %G%#%8%?%k2=7?F02hA|$N=t85

4.2 %+%C%H8!=P

K\8&5fGO!"%7%g%C%H$H8F$Plk2hA|E*$KO"B3$JF02hA|E*$N:%k$K$D$$$F?'%R%9%H%0%i%`$r:n@.$9$k!# :G>.C10L$KBP$7$FMM!9$J=hM}$r2C$($k!#$=$N$?$a$K%7%g%C%H%0%i%`NBg-5rM^@)9k$?$a$K!"?' $r@Z$jJ,1kI,MW$,$"$k!#$"$k%7%g%C%H$N:G8e$N%U%l!<%`16,777,216 ?' (24bit) $+$i 64 ?' (6bit) KMnH7?!#

<!$N%7%g%C%H$N:G=i$N%U%l!<%`$N4V$OITO"B3$G$"$j!"$ 3&$r%+%C%H$H8F$V!#%+%C%H8!=P$K$OMM!9$J<jK!$,DsOF$ $$$k$,!"$3$3$G$O6I=jE*$JJQF0$K6/$$$H8@olkDj3dχ^2 K!Khkb$N [D9:d 92] $r:NMQ$7$?!#

4.2.1 J,3d$\chi^2$8!DjK!

J,3d$\chi^2$8!DjK!$O0J2<$Nh&$J<j=g$G%+%C%H8!=P$r9T$

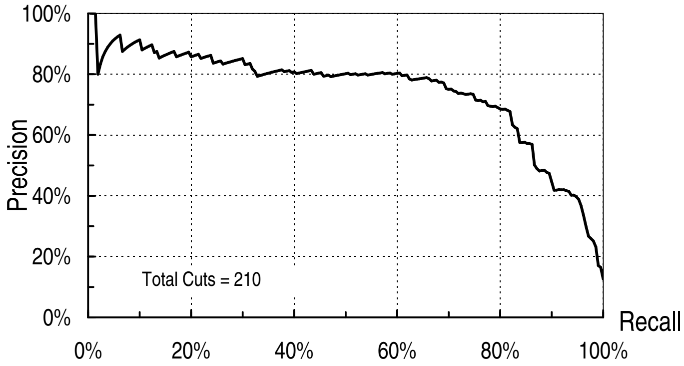
- G$0U$NNY@\$9$k 2 %U%l!<%`$,$H^2$$rHf3S9k!#
- 3F%U%l!<%`$r $m \times n$ $N9gF1$J%;%k $F^2_{k,l}$ $(0 \leq i,k \leq m-1, 0 \leq j,l \leq n-1)$ $KJ,3d$9$k!# $3$3GO $(m,n) = (4,4)$ $N 16 J,3d$9k3HK7?!#
- 3F%;

- 2 %U%l!<%`4V$NBP1~$9$k%;%k $F^1_{i,j}, F^2_{i,j}$ $K$*$1$k?'%R%9%H%0%i%`$H^1_{i,j}, H^2_{i,j}$ $rHf3S$7!"0c$$$r2<<0$K<($9h&$J χ^2 DjKh$jI>2A9k!#

$$\chi^2(i,j) = \sum_{c=0}^{63} \frac{(H^1_{i,j}(c) - H^2_{i,j}(c))^2}{H^1_{i,j}(c)} \qquad (2)$$

- H>?t$N%;%k ($3$N>l9g 8) $N χ^2 CM$,ogCM θ $rD6$(kH$-!"%+%C%H$r8!=P9k!#

?^ 3$KK\<jK!$rI= 1$N2hA|$KE,MQ7?!"%+%C%H8!=P$N:F8=N($HE,9gN($N4X78$r<($9!#



?^ 3: J,3d χ^2 8!DjK!Kh$k%+%C%H8!=P$NI>2A

60%$N:F8=N($G==J,G"kH9l$P!"80%$NE,9gN($,J}>2$5lk3H$,J,$+$k!#2hA|E*$KHs>o$KN`;w$7$?%7%g%C%H4V$G%+%C%H8!=P$,9T$($J$/$F$b!"$=$l$[$I:$$kLu$G$O$J$$$N$G!"60%DxEY$N:F8=N($G$b==J,$G$"$k!#$`$7$m!"$h$j9b$$E,9gN($NJ}$,K>$^$l$k!#

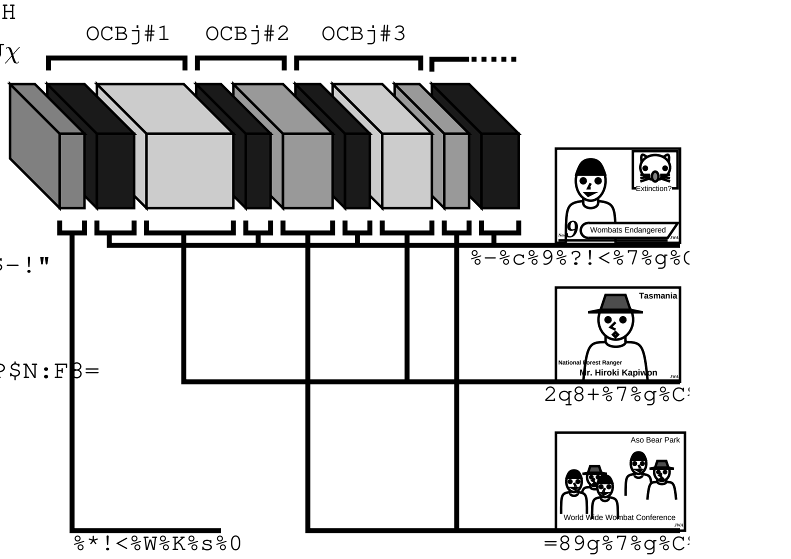
%+%C%H8!=P$K4X$7FO!"%/%i%9%?%j%s%0Kh$k<jK! [4de:94] $,Ds0F$5lF$$$kNG!":#8eO3$N<jK!$b;29MK9$k!#

4.3 2hA|E*FCD'NLCj=P

?^ 4$K<($9h&$K!"%K%e!<%9HVAH$O2hA|E*$KHf3SE*N`;w$7$?%7%g%C%H$K$h$jBgItJ,$,9=@.$5$l$F$$$k!#$3$l$i$NE57?E*$J%7%g%C%H$O2?$i$+$N6&DL$N2hA|E*FCD'NL$r$b$C$F$*$j!"Hf3SE*4JC1$J2hA|=hM}$K$h$jJ,N`$G$-$k$H9M$(il$k!#
J,N`$KMQ$$$k2hA|E*FCD'NLKOMM!9JbN,9M$($ilk$,!"8=;~E@$G$O?'>pJs$H4i$rMxMQ$7$F$$$k!#

4.3.1 ?'>pJs

:G$bC1=c$JFCD'NLG"k,!"N`;w$7$?2hA|4V$G$O?'%R%9%H%0%i%`$,Hf3SE*;w$F$$$k$H9M$(il$k!#$=N?$a!"%-%c%9%?!<%7%g%C%H$J$IHVAHCf$K2?EY$bEP>l$9$k%7%g%C%H$N8!=P$d!"%$%s%?%S%e!<Nh$&$K8r8_$KF1MM$N%7%g%C%H$,EP>l$9$k>l9g$N8!=P9kNKMQ$$$ilk!#



?^ 4: %K%e!<%9HVAH$N9=@.

4.3.2 4iNN0h

%9%?%8%*JIF1$8>l=j$G;#1F7?2hA|$O?'>pJs$rMxMQ$7J,N`$,2DG=$@$,!"0[Jk>r7o2<$G;#1F$7$?2hA|$N>l9g!"?'>pJs$,;w$F$$$J$$$3Hb$"$k!#$=$Nh&$J>l9g$G$b!"Bg;(GD9=?^$,;w$F$$$k>l9g$OB?$$!#FC$K%K%e!<%9$H$$$&J,Ln$K8E$9lP!"?M$N4i$OBg$-$J<j3]$+$jKJ$k!#
4iNN0hCj=P$K4X$7FOB?$/$N8&5f$,J$5lF$$$k$,!"$3GO4i$N=E?4$N0LCV, Bg$-$5, 8D?t$,J,$+lP$h$$$N$G!"0E$NJQ2=$K1F6A$5lK$/$$ HSI (H:?'D4, S::LEY, I:L@EY) ?'6u4V [HBIA] $rMQ$$$?H)?'NN0hCj=P<jK! [:4!9LZ 91] $r:NMQ$9$k!#
3l$@$1GO4iG"k+H]$+$OH=JLG-$J$$$?$a!"Cj=P$l$?NN0h$N30@\D9J}7A$N2#=DHf$, 0.7 $+$i 2.0 $NHO0O$N$b$$r4i$HH=Dj$7$?!#

4.4 %7%g%C%HJ,N`

2hA|E*FCD'NL$rMxMQ$7$?%7%g%C%HJ,N`$H7F!"8=;~E@$G0J2<$N3 DLjr:NMQ7F$$$k!#

- %-%c%9%?!<%7%g%C%H
- 2q8+%7%g%C%H
- =89g%7%g%C%H

0J2<$K!"3F%7%g%C%H$N8!=PJ}K!$H<B837k2L$r<($9!#

4.4.1 %-%c%9%?!<%7%g%C%H

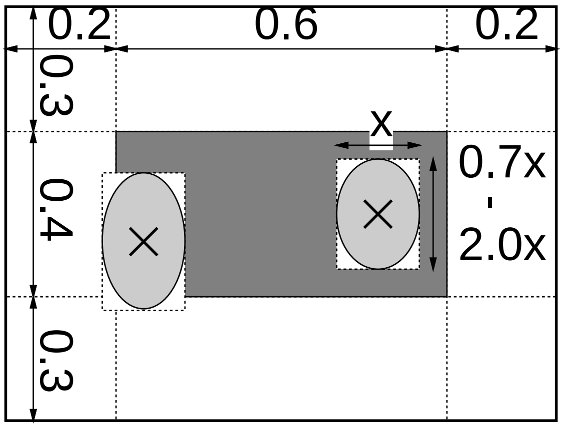
?^ 4$K<($9h&$K!"%K%e!<%9HVAHCf$N3FOCBj$N@hF,$K$O7?E*$J!V%-%c%9%?!<%7%g%C%H!W$,B8:_$9$k!#$=N?$a!"%-

%9%?!<%7%g%C%H$r8!=P$9k3HOOCBj$N6-3&$rH=CG9k
M-8zG"$j!"%-!<%o!<%ICj=P$N:]$K=EMW$G$"$k!#
I8Bj$N;zKk$r4^a?%7%g%C%H%b%G%k$rMxMQ$7$F%-%c%9%?!<%7%g%C%H$r8!=P9k<jK![;3K\ 96]b"k,!"HVAH8GM-$N%1%$%"%&%H$K0MB8$7F7$^$&$?$a!"K\8&5fGO0J2<$K<($9hJhjHFMQE*$J<jK!$rMQ$$$k!#

1. 4iNN0hCj=P
   3F%7%g%C%H$N@hF,%U%l!<%`$N$&$A!"?^ 5NLV+$1ItJ,$K 1 $D4iNN0h$N=E?4$,$"kbNrC5$9!#

2. ?'%R%9%H%0%i%`$NHf3S
   1.$G8!=P$5l?bN9YFN4V$NN`;wEYD$j$GI> 2A$7!"$=$NCf$G:G$bN`;w$7$?$bNN?t$,B?$+C?bN$ %-%c%9%?!<%7%g%C%HH9$k!#$3lO%-%c%9%?!<%7%g%C%H$,9bIQEY$GEP>l9k3H$r2>Dj$7$?$bNG$"$k!#

3N<jK!$rI= 1$NHVAHKE,MQ7$?7k2L!"19 $"$k%-%c%9%?!<%7%g%C%HKD$$$F!":F8=N(!"E,9gN(6&$K 100%$N@:EY$,F@$il?!#



?^ 5: %-%c%9%?!<%7%g%C%H / 2q8+%7%g%C%H$N8!=P

4.4.2 2q8+%7%g%C%H

0lHL$K!"1i@b$r7?$j!"%$%s%?%S%e!<$r<u$1$F$$$k%7%g%C%HGO!"1, 2 ?M$N?MJ*$,2hA|$NCf?4It$KB8:_9k!#3Nh&$J9=?^$N2hA|$r!V2q8+%7%g%C%H!W$HL>IU$1!"0J2<$Nh&$K8!=P$9$k!#

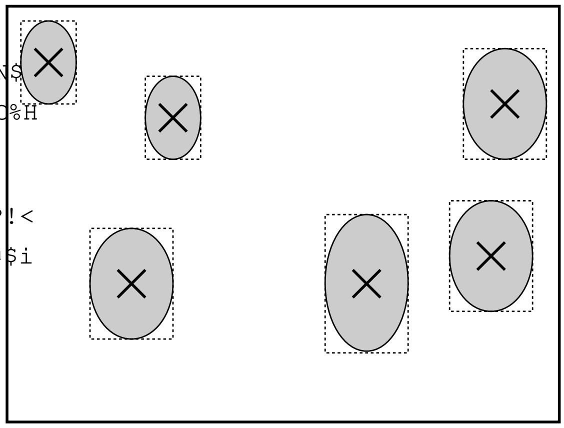
1. 4iNN0hCj=P
   3F%7%g%C%H$N@hF,%U%l!<%`$N$&$A!"?^ 5NLV+$1ItJ,$K 1 !A2 8D4iNN0h$N=E?4$,$"$kbN$rC5$9!#3NCf$+$i!" %9%?!<%7%g%C%H$N>r7o$rK~$?$9bN$rCj=P$7!";Djr2q8+%7%g%C%HH9$k!#

3N<jK!$rI= 1$NHVAHKE,MQ7$?7k2L!"50 $"$k2q8+%7%g%C%HKD$$$F!":F8=N(68%!"E,9gN(72%$N@:EY$,F@il$?!#

4.4.3 =89g%7%g%C%H

=82q$d2q5D$G?M!9$,Bt;31G$C$F$$$k%7%g%C%HGO!"2
$KB?$/$N4iNN0h$,8+il$k!#$3Nh$&$J9=?^$N2hA|$r!
%7%g%C%H!W$HL>IU$1!"0J2<Nh$&$K8!=P9k!#

1. 4iNN0hCj=P
   3F%7%g%C%H$N@hF,%U%l!<%`$N$&$A!"?^ 6$K<($9h&$
   8D0J>e$N4iNN0h$,B8:_9kbN$rC5$7!"=89g%7%g%C
   8!=P9k!#



?^ 6: =89g%7%g%C%H$N8!=P

3N<jK!$rI= 1$NHVAHKE,MQ7$?7k2L!"33 $"$k2q8+%
%HKD$$$F!":F8=N(24%!"E,9gN(67%$N@:EY$,F@il$?
Nh$&$KHs>o$K0-$$@:EY7+F@ilJ+C?NO!"?M!
mr8~$$$F$$$k3H$,B?$/!"4iNN0hCj=P$K<:GT$7$?$3$
2ilk!#

5 <+A38@8l=hM}

%F%l%SHVAHCfKO!"0J2<$K<($9h&$K!"$$$/D+$N0
<+A38@8l>pJs8;$,$"$k!#

- ;zKk
  2hA|CfKKda9~$^$l$? (<g$K CG Kh$k) J8;zNs!#
- J8;zJ|Aw!&%/%m!<%:%I%-%c%W%7%g%s
  1GA|HOJLBS0hGAwilk%G%#%8%?%k2=5l$?J8;
  2;@<$r=q$-2<7?bNG"k3H,B?$$!#
- <g2;@<
- I{2;@<
  <g2;@<HO0[Jk8@8l$KK]Lu$5l?2;@<$d!"2hA|$N
  $d2r@b$G$"$k3H$,B?$$!#

E*KO3liN>pJs$rAm9gE*$KMxMQ9kM=Dj$@$
8=:_GO;zKkN_$r07$&!#;zKk$OB>$N>pJs8;$H3S$Y$F!

%o!<%IKJ$jF@$k8l$,L)$K4^$^$lF*$j!">iD9$J>pJsNCfK

iNCj=P=hM}$r9T$oJ/Fb:Q$‘$H$$$&MxE@$,$"$k!#

5.1 7ABVAG2r@O

7ABVAG2r@OHO!"M?$($il?<+A38@8lJ8$r!"7ABVAG$H8F$P lk8@8lE*$J0UL#$rbD:G>.C10L$KJ,2r$7!"3F!9$N7ABVAG$N <oN‘(IJ;l$d3hMQ7AJI) $r2r@O$9k3HG$"$k [NLP]!#

F|K\8lrO8a!"El%"%8%"$N=t8@8l (Cf9q8l, D+A/8l$J$I) $O8l$H8l$,L)Ce$7$F$$$k$?$a!"7ABVAG4V$N6-3&$r@5$7$/8+D1kN$,:$FqG"$k!#$3lO!"8l$H8l$N4V$K:G=i$+$i6uGr$,$"$j!"IJ;l$NJ[JL$NJ}$,:$FqG"$k0u2$8l$r;O$aH9$kB>$N 8@8lHCx7$/0[$J$kFCD’$G$"$k!#

F|K\8l$N7ABVAG2r@O%D!<%k$H7F!"JUMAN[JUMAN] $H8F Pl$kHf3SE*9b@-G=$J%7%9%F%‘$,MxMQ2DG=G"$j!"K\8&5f$G $bMxMQ$7$F$$$k!#

5.2 0UL#B0@-2r@O

7ABVAG2r@O$O<+A38@8l$NI=LLE*$J2r@O$r9T$&$@1G$"$j!" 0UL#FbMFK^GODL>oN)$AF~$i$J$$!#7+$7!":w0zIU$1$r9T $&:]!"$D$^$jE,@Z$J%-!<%o!<%I$N<h<NA*Br$N:]$K$O!"8l$N0U L#FbMF$^$G9MN8$9$kI,MW$,$"$k!#

K\8&5fGO!"3F%7%g%C%HJ,N‘Kh$KE,$7$?:w0zIU$1$r9T$&$? $a!";zKk$,?M$r;X$9N+!">l=jr5$9$N$+!"F|;~$r;X9N$+!" $H$$$C$?0UL#B0@-$N2r@O$r9T$&!#;zKk$N0LCV$K4pE-3N$h $&$J0UL#B0@-$r2r@O$9$k<jK!$b8&5f5l$F$$$k [EOJU 96] $,!" FCDj$NJ|Aw6I$dHVAH$K0MB8$7$?CN<1$rMQ0U$7J1lPJi$J $$$?$a!"K\8&5f$GOh$jHFMQE*$J2r@O$r2DG=$K9k$?$a$K!" ;zKk$N<+A38@8l>pJs$=$NbN$+$i2r@O9k!#

5.2.1 ;zKk$NFCD’

I= 2$KI= 1$NHVAHCf$KEP>l$9$k 134 8D$N;zKk$NJ,N‘$r<($9!#

3N$&$A!"1, 2, 5 O=N^$^!"3, 4, 7 $O=EMW8l$NCj=PKb $r7P$F!"%-!<%o!<%I8uJdKJ$jF@$k!#$^$?!"6 O=N^$^$G$O 8l$N0UL#B0@-7hDj$N:]$K;29MKJ$k!#$3Nh$&$K9M$($k$H!" 62%$b$N;zKk$,$=$N$^$^%-!<%o!<%I8uJdHJ$jF@$k!#

1	>l=j	27%
2	?ML>JI	23%
3	Cj>]E*Jb$N(%?%$%H%k$r4^$‘)	13%
4	H/8@(K]Lu, MWLs$r4^$‘)	13%
5	F|;~	12%
6	J|Aw>e$N5;=QE*>pJs	9%
7	2hA|FbMF$NIA<L	3%

I= 2: %K%e!<%9HVAHCf$N;zKk$NJ,N‘(0lIt [3QED 96])

3N(1) ?ML>JI, (2) >l=j, (3) F|;~JN$G!";zKk$,3liN IN0UL#B0@-rbD+$rJ[JL$G$-$l$P!"0UL#B0@-IU$-$N%- %o!<%I8uJd$,F@il$k!#

3Nh&$J0UL#B0@-$N2r@O<jK!H7FO!"J8L.$rMxMQ$7 <jK!$bDs0F$5lF$$$k [Fa?\@n 97] $,!";zKk$N>l9g$OJ8L. 2r@O$G$-$k$[$I$ND9$5$,$J$$$N$G!"8lHx$NL>;l$N<oN‘$K1~ $?2r@O$r9T$&$3HK7?!#$=$N$?$aKO!"$^$:INh&$J ;l$,8lHx$KB8:_$9lPINB0@-$KJ,N‘$5lk$+$N<-=q$r:n 9kI,MW$,$"$k!#$3$3GO!"RWC %F%-%9%H%G!<%?%Y!<%9C $N RWC-DB-TEXT-95-2 $H$$$&!"1994 G/$NKhF|?7J95-;vCf$N 3,000 J8$r<jF0$G7ABVAG2r@O7?%3!<%Q%9$rMxMQ$7$?!#

5.2.2 8lHx$KB8:_$7$F?M$r<($9L>;l

8lHx$KB8:_$7$F?M$r<($9L>;l$r0J2<$N<j=g$G<}=8$7$?!#

1. @\Hx<-!V$i!W&V$?$A!W$rC5$9

2. D>A0$NC18l$,IaDLL>;l$+@\Hx<-$G$"$l$P!"$=$N8l$r<-= $KDI2C$9$k

$?$H$($P!"V66K\(L>;l-8GM-L>;l) <sAj(L>;l-IaDLL>;l) $i(I ;l-@\Hx8l)!W$N>l9g!"V<sAj!W$,Cj=P$5lk!#

3N7k2L!"260 $N0[$J$kL>;l$,Cj=P5l$?!#$7$+$7!"3 $@$1GO<-=qH9kK$O>/$J9.k?$a!"J,N‘8lWCI= [J,N $rMxMQ$7$F!"8lWC$rA}d7$?!#

J,N‘8lWCI=$O!"36,780 $NC18l$r3,AX9=B$$N35G0LZKh$jJ N‘$7$?$bNG$"$j!"F10lJ,N‘Fb$N8l$O0UL#$dMQK!$,N‘;w$7 $$$k!#6qBNE*KO!"Cj=P5l$?L>;l$,4^$^$l$kJ,N‘8lWCI= $NJ,N‘CJMn$K4^$^$l$kB>$N8l$r<-=q$KDI2C7?!#3NA‘:n hj!"J,N‘8lWCI=Cf$KB8:_$7$J$$L>;l$,=|5n$5$l 178 8l$K kbNN!":G=*E*KO 1,999 8l$,<}=8$5l?!#

3N<-=q$r JUMAN Kh$j7ABVAG2r@O7?I= 2$N 134 $N;z Kk$KE,MQ7?H3$m!":F8=N(93%!"E,9gN(90%$N@:EY$,F@$ l?!#JUMAN $N8GM-L>;l<-=qCf$K5-:\$N$"$k?ML>$dCOL>$ 7ABVAG2r@O$NCJ3,$G2r@O5lk,!"8GM-L>;lGO$J$$!V<sA JI$N8l$K$D$$$F$O>e5-$N 1,999 8l$N<-=qCf$K4^$^$lk+H $($kI,MW$,$"$k!#8GM-L>;l$G$J$$;zKk$K4X$9$k<B837k2L!"$D$^ $?<jK!C1FH$NI>2A$O!":F8=N(92%$HJC$?!#

J*!"G’<11LlO0J2<$N>l9g$K@8$8$?!#

- J,N‘8lWCI=$N8lWCITB-
  ex. !V%\%i%s%F%#%"!W$OJ,N‘8lWCI=Cf$K$J$$

- <}=8$7$?L>;l$NITB-
  ex. !VHI!W$r4^$‘J,N‘CJMn$O<}=8$5l:

0lJ}!"8mG’<1$O0J2<$N>l9g$K@8$8$?!#

- 8l$NB?5A@-
  ex. !V20!W&V8^NX(4j$s/$$$D$o)!W$O?MKb>l=jKb$ $jF@$k

5.2.3 8lHx$KB8:_$7$F>l=j$r<($9L>;l

8lHx$KB8:_$7$F>l=j$r<($9L>;l$r0J2<$N<j=g$G<}=8$7$?!#

1. !VCO0h$rI=$98GM-L>;l!W$rC5$9
2. 8eB3$9$kL>;l$rC)$k
3. :G8e$NL>;l$N8e$,=u;l!V$G!W!&V$K!W!&V$X!W!&Vhj!W!&V$K $F!W$G$"$l$P!"$=$N8l$r<-=q$KDI2C$9$k

$?$H$($P!"V2#IM(L>;l-8GM-L>;l-CO0h)@~(L>;l-IaDLL>;l)66 K\(L>;l-8GM-L>;l-CO0h)1X(L>;l-IaDLL>;l)$G(=u;l)!W$N>l 9g!"V1X!W$,Cj=P$5lk!#

3N7k2L!"389 $N0[$J$kL>;l$,Cj=P5l$?!#$7$+$7!"3N 4p=`$G$O!V%"%a%j%+(L>;l-8GM-L>;l-CO0h)BgE}NN(L>;l-IaDL L>;l)$X(=u;l)!W$K$h$j!VBgE}NN!W$N$h$&$KK\Mh?M$dB>$N$b $N$K$D$/L>;l$b4^$^$l$F$$$k!#$=$N$?$a!"5.2.2 $GCj=P$7$? <-=q$H=EJ#$9$k$b$N$r=|5n$7$?$H$3$m!"344 8l$K8:>/$7$?!# $3$l$KBP$7$F!":F$SJ,N`8lWCI=$rMxMQ$7$?$H3m!"141 8l$K 8:$kbN$N!":G=*E*$K$O 2,572 8l$,<}=8$5$l$?!#

3N<-=q$r JUMAN Kh$j7ABVAG2r@O7?I= 2$N 134 $N;z Kk$KE,MQ7?H3$m!":F8=N(81%!"E,9gN(91%$N@:EY$,F@$i l?!#JUMAN $N8GM-L>;l<-=qCf$K5-:\$N$"$k?ML>$dCOL>$O 7ABVAG2r@O$NCJ3,$G2r@O5lk,!"8GM-L>;lGO$J$$!V1X!W JI$N8l$K$D$$$F$O>e5-$N 2,572 8l$N<-=qCf$K4^$^$lk+H] $+$rD4Y?!#8GM-L>;lGJ$$;zKk$K4X$9$k<B837k2L!"$D$^$j K\<jK!C1FH$NI>2A$O!":F8=N(91%HJC?!#

J*!"G'<11LlO0J2<$N>l9g$K@8$8$?!#

- JUMAN 8GM-L>;l<-=q$N8lWCITB-
  ex. !V%j%^!W$O8GM-L>;l<-=qCf$K$J$$
- J,N`8lWCI=$N8lWCITB-
  ex. !VMa>l!W$OJ,N`8lWCI=Cf$K$J$$

0lJ}!"8mG'<1$O0J2<$N>l9g$K@8$8$?!#

- J,N`8lWCI=$NJ,N`HNIT0lCW
  ex. !V5DO@!W$H!V2q5D!W$,F10l9`L\$KJ,N`

5.2.4 8lHx$KB8:_$7$FF|;~$r<($9L>;l

?M$d>l=j$H0[Jj!"F|;~$K4X$7FOMF0W$K8!=P$G$-$k!#%3!< %Q%9$+$iCj=P9k$^$GbJ$/!"L>;l@-L>;l=u?t<-!VG/!W!V7n!W !VF|!W!V;~!W!VJ,!W!VIC!WJI$r<j3]$+jK7?H3$m!"$9YF $NF|;~$K4X9k;zKk$,8!=P$G$-$?!#

6 =hM}7k2L$NE}9g

0J>e$N=hM}!"$D$^$j2hA|=hM}Kh$k%7%g%C%H$NJ,N`$H?M$H>l=j$N<1JL$r9T$&$?$a$KCj=P$7$?<-=q$r$5$i$K@ A38@8l=hM}$K$h$k;zKk$N0UL#B0@-2r@O$N7k2L$rE}9g$7$F!"$b$N$K$9$kI,MW$,$"$k!#$3$l$K$O!"<-=qCf$N8l$N@ 0zIU$1$r9T$&!#$3$3$G$O!"3F%7%g%C%HJ,N`$KE,$7$?:w0zIU$1"<~0O$N8l$N0UL#B0@-$r;29M$K9k<jK!$N8!F$$ $,$"kH9M$(!"6qBNE*$K$O0J2<$Nh&K7$F9T$C$?!#$$l$k!#

- 2q8+%7%g%C%H
  ?M1, (?M2), F|;~
- =89g%7%g%C%H
  >l=j, (=82qL>), F|;~

3F!9$N9`L\$K$O!"OCBj$NKAF,$N%7%g%C%H$+$i3F%7%g%C% $N;zKk$N$&$A!"BP1~7?0UL#B0@-rb$D!":G$b6aK5$N; $i%-!<%o!<%I$rCj=P9k!#$=$N7k2L$rI= 3$K<($9!#

J,N`	!?M !	!>l !=j	=82qL>	F| !;~
2q8+	63%	—	—	12%
=89g	—	97%	29%	32%

I= 3: :w0zIU$1@.8yN(

>l=j$N:w0zIU$1O[$\LdBj$J$$$,!"?MKD$$$F 63%$H NOM=A[30$KDc$$!#3l$O!"8=:_$NBP1~IU$1<jK!$G$O! jb:Y$+$$HVAH$N9=@.$r9MN8$7$F$$$J$$$?$a!"F10l?MJ EY$b8r8_$K=P$F$/$k>l9gJI$KB?$/$N8m$jrHH7$F$$$ $?!"F|;~$,Hs>o$KDc$$@.8yN($r<($7$F$$$kNO!"$=$b$;~$K4X9k;zKk$,>/$J$$$?aG$"$k!#HVAHJT=8>e!"$*$ EvF|$NIGA|$K$D$$$F$OF|;~$r>JN,7F$$$kbN$H9M$($

7 $*$ojK

K\H/I=GO!"=>Mh$N<+F0E*:w0zIU$1<jK!GOJ]>Z5 J+C?!"2hA|FbMF$H%-!<%o!<%I$N0lCW$rJ]>Z$7!"$+$ FbMF$KE,$7$?%-!<%o!<%I$r:w0zIU$1$9$k<jK!$rDs0F$7! E*$JI>2A$N7k2L$r<(7?!#

$^$?!"?M$H>l=j$K8BDj5l$F$$$kbN$N!"<+A38@8l> $_$rMxMQ7?;zKk$N0UL#B0@-2r@O<jK!$b>R2p$7!"<B:]$ $r2r@O$7F=$NM-8z@-$r<(7?!#

7.1 :#8e$N2]Bj

7.1.1 2hA|=hM}

8=:_MQ$$$F$$$k2hA|E*FCD'NL$O@E;_2hA|%l%Y%k$NbN :#8e$OF02hA|$NFCD'$rH?1G$7$?FCD'NL(2hA|$NF0$-$N7 JI)$bMxMQ$7$?$$!#$^$?!"8=:_$N%7%g%C%HJ,N`4p=`$O? hkbN$@$,!"%K%e!<%i%k%M%C%H%o!<%/JI$rMxMQ$7$ 3X=,Kh$kJ,N`$r9T$($J$$$+8!FCfG$"$k!#

7.1.2 <+A38@8l=hM}

$^$?!"8GM-L>;lXN0UL#B0@-IU1O JUMAN KMji6k$r F@$J$$$?$a!"8=:_!"M9@/>J$h$jDs6!$5lF$$$k?7M9JXHV9f$G!< %?%Y!<%9$K<}O?5l$F$$$kA49q 11 K|7o (>.;z0J>e) $NCOL><- =q$N:n@.K"$?$C$F$$$k!#3l0J30Kb!"309qCOL>$d?ML>$N <-=q$N@0Hw$bI,MW$G!"<B:]?7J95-;v$+iN?ML>3MF@<jK!$b8% 5f$5lF$$$k [5W8w 97] bN$N!"8=;~E@$G$O>pJs8;$,ITB-7F $$$k!#

7.1.3 E}9g=hM}

K\J8Gb5-7?h&$K!"8=:_$N%7%g%C%H$H%-!<%o!<%I$NBP 1~IU$1<jK!$OHs>o$KC1=c$G$"$k$?$a!"8r8_$KF10l?MJ*$,=P$F $/$k!"JI$N9=@.$rGD0.7?=hM}$r8!F$$9$k!#

$^$?!"8=:_$O%7%g%C%HJ,N`$NJ}$+$i%-!<%o!<%I$rC5$7$F$$ $k$,!"5U$K?ML>$,EP>l$9$k$3$H$r%7%g%C%HJ,N`$KMxMQ9k$3 HJIN8!F$$bJ;$;$F9T$&!#

Cm5-

JUMAN $O5~ETBg3XBg3XD9Hx8&5f<<$HF`NI@hC<2J3X5;=QBg 3X1!Bg3X>>K\8&5f<<$K$F3+H/$5$l$?%U%j!<%=%U%H%&%'%"$G$" $k!#$^$?!"J,N`8lWCI=$O9qN)9q8l8&5f=j$N4)9TJ*G"$k!#

RWC %F%-%9%H%G!<%?%Y!<%9$O5;=Q8&5fAH9g?7>pJs=hM}3+ H/5!9=(RWCP) $N@.2LJ*$G$"$j!"F15!9=$N5v2D$N2<$KMxMQ$7 $?!#$J$*!"KhF|?7J9$N5-;v$NMxMQ$K4X9k5v2D$O>e5-%G!<% %Y!<%9MxMQ5v2D$K4^$^lF$$$k!#

H/I=J88%

- 0f<j 0l0:, EDCf 1QI'; !V2hA|!&8@8l>pJs$NE}9gE*MxMQ$K hk1GA|%G!<%?$N<+F0E*%$%s%G%/%7%s%0$N;n$_!W; 8@8l =hM}3X2qBh 3 2sG/<!Bg2q, pp.485-488, Mar 1997.
- 0f<j 0l0:, EDCf 1QI'; !VKvHx$NL>;l$KCeL\$7$? TV J|Aw Cf$N;zKk$N0UL#B0@-2r@O<jK!!W; >pJs=hM}3X2qBh 55 2sA4 9qBg2q, vol.2, pp.91-92, Sep 1997.
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