$YZ, A, CCZ',$

$A \quad y\,3\,C\,A\,A$

$YZ, A, CY'C$

$y\,3\,C\,A\,y'A$

$W\,X\,Y\,Z$

$\bar{W}\,\bar{X}\,\bar{Y}\,\bar{Z}$

$\rightarrow$

$\bar{W}, X\,Y\,Z\,W, X\,Y$

$\bar{W}, \bar{X}\,\bar{Y}\,\bar{Z}\,\bar{W}, \bar{X}\,\bar{Y}$

Thus self with self is cyclic

$YZ, A, X'CC,$

$y\,3\,C, x'AA$

$W_1 X_1 Y_1 Z_1, W_2 X_2 Y_2 Z_2 \rightarrow X_1 Y_1 Z_1 W_1, X_2 Y_2 Z_2 W_2$

A, AAZ', A, XY

$A, AY'A, A, XY$

$A, X'AA, A, XYZ$

Notation defective

Rules for $A, XYZ,$

AAZ' excludes $AZ'A$ + $Z'AX$

$AY'A$ excludes $Y'AA$ + AXY

$X'AA$ excludes AAX + AXY

Forwards

A in 1st position — i.e. $A, AY'Z', A$ — fails

A in 2nd position — i.e. $A, X'AZ', A, X$

A in 3rd position — $A, X'Y'A, A, XY$

Thus $AY'Z'$ excludes $Y'Z'A$

$X'AZ'$ excludes $Z'AX$

$X'Y'A$ excludes AXY

Backwards

C in 1st position — $YZ\,A, CY'Z', A$

$y\,3\,CA, A$

C in 2nd position — $Z, A, X'CZ', A$

$3\,C, x'A$

C in Third position — $A, X'Y'C, A$

$C\,x\,y\,A$

$CY'Z'$ excludes $C3y$

$X'CZ'$ excludes $x'C3$

$X'Y'C$ excludes $y'x'C$

CCZ' excludes $C3y$ + $AC3$

$CY'C$ excludes $y'AC$ + $C3y$

XCC excludes $Ax'C$ + $x'C3$

Summary of 4 letter codes.

beginning with A, plus some other restriction.

Sydney's first code $\quad A, \overset{\text{no}}{A}\ \overset{\text{no}}{A}\ \overset{\text{no}}{A}.$

This is

BBB	CBC	DBB		
BBD	CCB	DBD	BBC or DDC	= 16
BCC	CCC	DCC		
BDB	CCD	DDB		
BDD	CDC	DDD	✓ o.k.	

~~Sydn~~ Sydney's second code $\quad A, \cdot\ \overset{\text{no}A}{\cdot}\ \overset{\text{no}A}{\cdot}$

as above, plus $A\ \begin{matrix}B\\D\end{matrix}\ \begin{matrix}B\\D\end{matrix}$ $\quad = 20$

My first code, corrected $\quad A, \overset{\text{no}}{C} \cdot \overset{\text{no}}{A},$ (nothing with two C's)

$A\ \begin{matrix}A\\B\\C\\D\end{matrix}\ \begin{matrix}D\\B\end{matrix}$ $\quad \begin{matrix}B\\D\end{matrix}\ \begin{matrix}B\\D\end{matrix}\ \begin{matrix}B\\D\end{matrix}$ $\quad \begin{matrix}A\\B\\D\end{matrix}\ A\ C$ $\quad A\ \begin{matrix}B\\D\end{matrix}\ C$ $\quad$ BBC or DDC $\quad BC\ \begin{matrix}B\\D\end{matrix}$ $\quad = \cancel{22}\ 24$

My second code $\quad A, \cdot\ \cdot\ \begin{matrix}\text{no}A\\\text{no}C\end{matrix}$

$\begin{matrix}A\\B\\D\end{matrix}\ \begin{matrix}B\\D\end{matrix}\ \begin{matrix}B\\D\end{matrix}$ $\quad \begin{matrix}A\\C\end{matrix}\ A\ \begin{matrix}B\\D\end{matrix}$ $\quad \begin{matrix}A\\B\end{matrix}\ C\ \begin{matrix}B\\D\end{matrix}$ $\quad$ [or $D\ C\ \begin{matrix}B\\D\end{matrix}$ instead of $B\ C\ \begin{matrix}B\\D\end{matrix}$] $\quad = 20$ ✓

The 26 Possible sets of the form A, . . .

A ~ C B ~ D

- AAB ABA BAA
- BBB
- AAC ACA CAA CCC
- AAD ADA DAA
- DDD

ABC BCA DCC

ABD BDA

ACB CBA CCD

ADB DBA

ACD CDA CCB

ADC DCA BCC

- CBB CDD
- BBC DDC
- DBB
- BBD
- DDB
- BDD

BAC CAB CDC

BAD DAB

CAD DAC CBC

- BCB DCD
- BDB
- DBD

ABB BBA

ADD DDA

BCD DCB

also for the form

. . . A

Possible codes with A, . . .

~~A~~

No C (where x)

~~no A~~ No A	x x x	. x x	x . x	x x .	x . .	. x .	. . x	. . .	
x x x	8	8	9	9	11	11	11	16	
x x	12	12	16	15	19	17	16	22	
x x	9	~~12~~	11	12	15	12	~~15~~	18 ?	all
x x	12	15	16	12	16	17	19		
x					20		22		~~all~~
x									all
x					24		20		
. . .								?	

A, :

A x y z A,

A z y x

Rules for checking codes of the form $A, \ldots$

$A \sim C$
$B \sim D$

Notation $A, XYZ,$ $C, xyz.$ for all and any particular subset is $A, X_0Y_0Z_0,$ $C, x_0y_0z_0,$

Forward rules

$A, AY_0Z_0A,$ $\longrightarrow$

A, X_0AZ_0, A, X $\longrightarrow$

A, X_0Y_0A, A, XY $\longrightarrow$

A, X_0AA, A, XYZ $\longrightarrow$ $\longrightarrow$

A, AY_0A, A, XY $\longrightarrow$ $\longrightarrow$

A, AAZ_0, A, XY $\longrightarrow$ $\longrightarrow$

AY_0Z_0 rejects Y_0Z_0A

X_0AZ_0 rejects Z_0AX

X_0Y_0A rejects AXY

X_0AA rejects AXY and AAX

AY_0A rejects Y_0AA and AXY

AAZ_0 rejects AZ_0A and Z_0AX

Backwards

$YZ, A, CY_0Z_0, A,$

$y\,z\,C\,A$ $\longleftarrow$

YZ, A, X_0CZ_0, A

$z\,x_0\,A$ $\longleftarrow$

A, X_0Y_0C, A

$C\,x_0\,y_0\,A$ $\longleftarrow$

CY_0Z_0 rejects Czy

X_0CZ_0 rejects x_0Cz

X_0Y_0C rejects y_0x_0C

Z, A, X_0CC, A

$z\,C\,x_0\,A\,A\,C$ $\longleftarrow$ $\longleftarrow$

YZA, CY_0C, A

$y\,z\,C\,A\,y_0\,A\,C$ $\longleftarrow$ $\longleftarrow$

XYZ, A, CCZ_0, A

$x\,y\,z\,C\,A\,A\,z_0$ $\longleftarrow$ $\longleftarrow$

XYZ, A, CCC, A

$x\,y\,z, CAAA,$

X_0CC rejects Ax_0C + x_0Cz

CY_0C rejects y_0AC + Czy

CCZ_0 rejects ACz + Czy

CCC -- AAC, ACz + Czy

o.k. ✓

A~C B-D.

26 Sets of the form · A · ·

AAB ABA BAA

BBB

AAC ACA CAA CCC

AAD ADA DAA

DDD

ABC CAB ~~DCC~~ CDC

ABD DAB

ACB BAC DCC

ADB BAD

ACD DAC BCC

ADC CAD ~~B~~CBC

BCA CBA CCD

BDA DBA

CDA DCA CCB

BBC DDC

BBD

DDB

ABB BAB

ADD DAD

DBC BDC

BCB DCD

CBB CDD

BDB

DBB

BDD

DBD

A ~ C B ~ D

26 Sets of the form . . A .

AAB BAA ABA

BBB

AAC CAA ACA CCC

AAD DAA ADA

DDD

—

CAB BCA CCD

DAB BDA

BAC CBA CDC

BAD DBA

DAC CDA CBC

CAD DCA CCB

—

BBC DDC

BCB DCD

BBD

BDB

DBD

DDB

—

ABC ACB DCC

ABD ADB

ACD ADC BCC

CBB CDD

DBB

BDD

—

BAB BBA

DAD DDA

CDB CBD

—