$YZ, A, CCZ',$

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

$\longleftarrow$

$YZ, A, CY'C$

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

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

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

$\longrightarrow$

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

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

Thus self with self is cyclic

$YZ, A, X'CC,$

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

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

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. $A, AY'Z', A$ $\longrightarrow$ fails

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

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

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

A in 3rd position — $A, X'Y'A, A, XY$ $\longrightarrow$

$X'Y'A$ excludes AXY

Backwards

C in 1st position — $YZ\,A, CY'Z', A$

$y\,3\,CA, A$ $\longleftarrow$

$CY'Z'$ excludes C_{3y}

$X'CZ'$ excludes $x'C_3$

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

C in 2nd position — $Z, A, X'CZ', A$

$3\,C, x'A$ $\longleftarrow$

C in Third position — $A, X'Y'C, A$

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

CCZ' excludes C_{3y} + AC_3

$CY'C$ excludes $y'AC$ + C_{3y}

XCC excludes $Ax'C$ + $x'C_3$

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

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

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

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

$\begin{matrix}A\\B\\D\end{matrix}\,\begin{matrix}B\\D\end{matrix}\,\begin{matrix}B\\D\end{matrix} \qquad \begin{matrix}A\\C\end{matrix}\,A\,\begin{matrix}B\\D\end{matrix} \qquad \begin{matrix}A\\B\end{matrix}\,C\,\begin{matrix}B\\D\end{matrix} \qquad \left[\text{or } \underset{\text{instead of } BC\,\begin{matrix}B\\D\end{matrix}}{\underline{\underline{D}}\,C\,\begin{matrix}B\\D\end{matrix}}\right] = 20$ ✓

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

- 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

A ~ C B ~ D

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, . . .

No C (where ×)

No A	× × ×	· × ×	× · ×	× × ·	× · ·	· × ·	· · ×	· · ·
× × ×	8	8	9	9	11	11	11	16
· × ×	12	12	16	15	19	17	16	22
× · ×	9	~~12~~	11	12	15	12	~~15~~	18 ?
× × ·	12	15	16	12	16	17	19	
× · ·					20		22	
· × ·					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

$A, AY_0Z_0A,$

A, X_0AZ_0, A, X

A, X_0Y_0A, A, XY

A, X_0AA, A, XYZ

A, AY_0A, A, XY

A, AAZ_0, A, XY

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

$YZ, A, CY_0Z_0, A,$

$y\ z\ C\ A$

YZ, A, X_0CZ_0, A

$z\ x_0\ A$

A, X_0Y_0C, A

$C\ x_0\ y_0\ A$

CY_0Z_0 rejects Czy

X_0CZ_0 rejects x_0Cz

X_0Y_0C rejects y_0x_0C

Z, A, X_0CC, A

$z\ C\ x_0\ A\ A\ C$

YZA, CY_0C, A

$y\ z\ C\ A\ y_0\ A\ C$

XYZ, A, CCZ_0, A

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

XYZ, A, CCC, A

$xyz, CAAA,$

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

BCB DCD

CBB CDD

BDB

DBB

BDD

DBD

BCA CBA CCD

BDA DBA

CDA DCA CCB

BBC DDC

BBD

DDB

ABB BAB

ADD DAD

DBC BDC

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

—