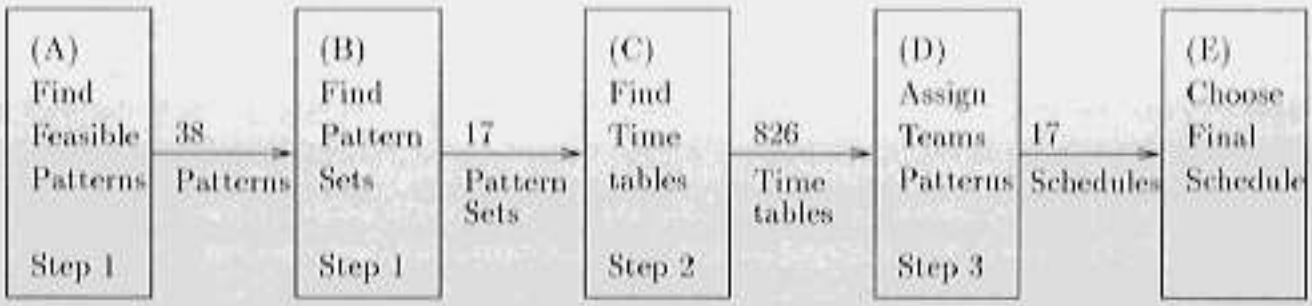
OUTLINE OF ALGORITHM



Constraints

(A)	(B)	(C)	(D)	(E)
Pattern	Game Count	Team Pairing Mirroring	Final Slot TV Preferences Team Requirements Opponent Ordering	Preferences Intangibles

EXAMPLE

Four team round robin, with teams a,b,c,d.

Step 1. Chose the pattern set:

1:HHA
2:AHA
3:HAH
4:AAH

Step 2. Timetable

1:(-2)(-3)(4)
2:1(-4)3
3:(-4)1(-2)
4:32(-1)

Step 3. Schedule

d:(-b)(-a)c
b:d(-c)a
a:(-c)d(-b)
c:ab(-d)

ACC REQUIREMENTS

Many, many requirements; many found during process.
Constraints during Step 1 (pattern sets):

- Each week has a "During Week" game and a "Weekend" game.
- Four home weekends, four away weekends, one bye weekend.
- No AAA or HHH sequences
- Prefer no ABA or HHBH sequences
- Similar restrictions on weekends.
- Do not end AA or (preferably) start AA

ACC REQUIREMENTS

Imposed in Step 2 (timetable)

- Aim for "mirrored schedule": if A at B in slot i, then B at A in slot $i+9$. Not quite possible, but good separation wanted.

Imposed in Step 3 (schedule)

- Many team requirements and requests including required byes, need to open and/or finish season at home.
- Finish season with "traditional rivals"
- TV preferences. Very convoluted, but every slot is either an A (best), B, or Bad-slot.
- Two Duke/UNC games in second half of schedule (which precludes perfect mirroring).
- No Duke/UNC or Duke/Wake/UNC (any order and home/away) sequences.

Bit more (fully explained in paper, minor additional details on my web page).

ACC BASKETBALL SCHEDULE (1998) Official Schedule, Accepted: November 1996

Slot	Clem	Duke	FSU	GT	UMD	UNC	NCSt	UVA	Wake
Dec	UMD	UVA	UNC	NCSt	@Clem	@FSU	@ GT	@Duke	Bye
1/3	UNC	@UMD	@NCSt	Bye	Duke	@Clem	FSU	Wake	@UVA
1/7	@Wake	NCSt	@UMD	@UNC	FSU	GT	@Duke	Bye	Clem
1/10	Bye	@FSU	Duke	Wake	@NCSt	UVA	UMD	@UNC	@ GT
1/14	FSU	@Wake	@Clem	@UVA	UNC	@UMD	Bye	GT	Duke
1/17	@Duke	Clem	@ GT	FSU	@Wake	Bye	@UVA	NCSt	UMD
1/21	UVA	Bye	Wake	UMD	@ GT	@NCSt	UNC	@Clem	@FSU
1/24	@UMD	@UVA	@UNC	@NCSt	Clem	FSU	GT	Duke	Bye
1/28	@UNC	UMD	NCSt	Bye	@Duke	Clem	@FSU	@Wake	UVA
1/31	NCSt	GT	Bye	@Duke	UVA	@Wake	@Clem	@UMD	UNC
2/4	@ GT	@UNC	@UVA	Clem	Bye	Duke	Wake	FSU	@NCSt
2/7	Wake	@NCSt	UMD	UNC	@FSU	@ GT	Duke	Bye	@Clem
2/11	Bye	FSU	@Duke	@Wake	NCSt	@UVA	@UMD	UNC	GT
2/14	@FSU	Wake	Clem	UVA	@UNC	UMD	Bye	@ GT	@Duke
2/18	Duke	@Clem	GT	@FSU	Wake	Bye	UVA	@NCSt	@UMD
2/21	@UVA	Bye	@Wake	@UMD	GT	NCSt	@UNC	Clem	FSU
2/25	@NCSt	@ GT	Bye	Duke	@UVA	Wake	Clem	UMD	@UNC
2/28	GT	UNC	UVA	@Clem	Bye	@Duke	@Wake	@FSU	NCSt

Minimum Difference between repeating games: 7
Length 3 or more Home (Bye=Away): 0
Length 3 or more Home (Bye=Home): 3
Length 3 or more Away (Bye=Away): 3
Length 3 or more Away (Bye=Home): 0
3 consecutive weekends at home: 0
3 consecutive weekends away: 0
Teams starting Away/Away: 1
Teams ending Away/Away: 0
Teams with away in first slot two years in a row: 0
Teams with away in last slot two years on a row: 0
Consecutive Duke/UNC (never A/A): 0
A slots: 4; B slots: 2; Bad slots: 2.

Major League Baseball: DESCRIPTION OF PROBLEM

Major League Baseball: a $1.5 billion/year business with many levels of administration.

- Major League Baseball (acting commissioner)
- 2 Leagues: American and National League (president)
- 14 Teams/league
- Players union
- TV/Radio
- Fans

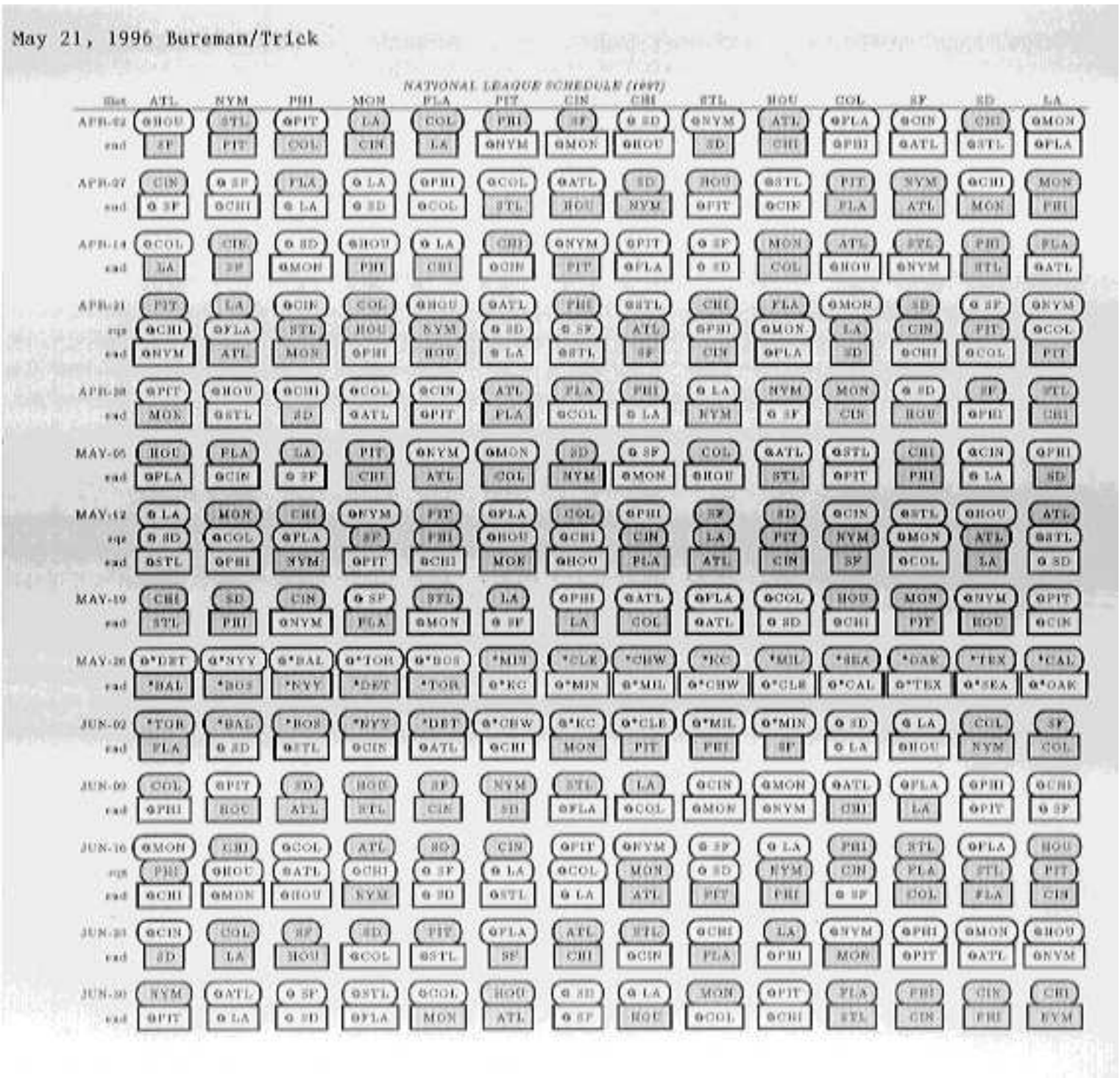
SCHEDULE OBJECTIVES

- Few Semi-repeaters (two series between teams within a week).
- Team requests
- Rivals in summer weekends
- Fairness among teams and for any given team over the years.

OTHER SCHEDULE RESTRICTIONS

- Home half of the weekends.
- Home half of the summer weekends.
- Required off days (once every 21 days)
- All Star Break
- Team requirements
- No Repeaters (back to back series)
- First half/second half visits
- Weekend visits

May 21, 1996 Bureman/Trick



CONCLUSIONS AND FUTURE RESEARCH

Where do we go?

1. Need for fast, flexible system clear from the numerous iterations
2. Combinatorial design not needed: integer programming and enumeration enough.
3. Interest in real scheduling issues.
4. "Trip formulation" has chance to put three phases together.

Interesting Questions:

1. Characterization of feasible pattern sets?
2. Characterization of timetables?
3. Non-round robin schedules
4. Extend to larger leagues
5. LP not providing a lot of information; perhaps a more combinatorial approach (*constraint programming*).