Player score:

沒 OBP_p 時:
$OBP_p = OBP_{season}$

(打)

$$B = \frac{(OPSt_{season} + OPSt_{month} + OPSt_{field} + \frac{OBP_p}{OBP_{season}} \times 100)}{400}$$

(守)

$$F = \frac{FPCT_{season}}{FPCT_{\mu pos}}$$

CPBL Avg:

OBP_μ (上壘) = 0.327
SLG_μ (長打) = 0.365

$FPCT_\mu$ (守備) = 0.980

μ_{pos}
- C = 0.992
- 1B = 0.993
- 2B = 0.977
- 3B = 0.929
- SS = 0.964
- LF = 0.977
- CF = 0.988
- RF = 0.976

abnormal values:

$FPCT_{season} = 1 \Rightarrow FPCT_\mu = 0.98$
$< 0.8 \Rightarrow 0.8$

$OPSt_{season} > 160 \Rightarrow 100$
$\leq 0 \Rightarrow 0$

$OBP_{season} = 0 \Rightarrow 1$
$= 1 \Rightarrow OBP_\mu = 0.327$

Position weight:

	w_B	w_F
C	0.95	1.05
1B	1.21	0.83
2B	0.97	1.03
3B	0.96	1.04
SS	0.94	1.06
LF	1.02	0.98
CF	1.04	0.96
RF	1.17	0.85

Statistic formulation:

① $SLG = TB / AB$

② $OPSt = (OBP/OBP_\mu) + (SLG/SLG_\mu) - 1$

③ $wOBA(O_{jk}) =$ (↓ 1B)

$$\frac{(0.72IBB + 0.75HBP + 0.9(H - 2B - 3B - HR) + 1.242B + 1.563B + 1.95HR)}{PA}$$

stage 1 : pick 8 players (no DH)

$X_{ijg} = 1$ if player i is in position j in game g

$A_{ij} = 1$ if player i can be in position j

V_{ij} is score of player i in position j $\Rightarrow V_{ij} = (w_B B_i + w_F F_{ij}) A_{ij}$

N is the number of games in a week

$G = \{1, \dots, N\}$

Z_g is weight of game g depends on opponent team

- 中信 : 1.15
- 統一 : 1.11
- 樂天 : 0.96
- 富邦 : 0.93
- 味全 : 0.85

S_1 is a set containing star players who must be starting player in every game.

S_2 is a set containing potential players who should be starting player at least 1 game.

S_3 is a set containing old or injured players who must be bench player at least 1 game.

$$\max \sum_{g \in G} \sum_{j \in J} Z_g V_{ij} X_{ijg}$$

s.t.

$$F_{i8} X_{i8g} \geq F_{i7} X_{i7g} \qquad \forall i \in I, \forall g \in G$$

$$F_{i8} X_{i8g} \geq F_{i7} X_{i9g} \qquad \forall i \in I, \forall g \in G$$

$$\sum_{i \in I} X_{ijg} = 1 \qquad \forall j \in J, \forall g \in G$$

$$\sum_{j \in J} X_{ijg} = 1 \qquad \forall i \in I, \forall g \in G$$

$$\sum_{g=n}^{n+k} X_{izg} \leq 3 \qquad \forall i \in I, n \in G, n+k \leq N \quad (\text{C連續出賽} \leq 3)$$

$$\sum_{g \in G} X_{ijg} = N \qquad \forall i \in I, j \in J, \text{if player } i \in S_1$$

$$\sum_{g \in G} X_{ijg} \geq 1 \qquad \forall i \in I, j \in J, \text{if player } i \in S_2$$

$$\sum_{g \in G} X_{ijg} < N \qquad \forall i \in I, j \in J, \text{if player } i \in S_3$$

$$X_{ijg} \in \{0, 1\} \qquad \forall i \in I, j \in J, g \in G$$

After stage 1, let the player with highest B_i be DH and go to stage 2.

Stage 2: batting order

P_{jk}: PA of k^{th} batting order player of position j

$P_{jk} \geq 30$ or left max P_{jk} only otherwise

O_{jk}: wOBA of k^{th} batting order player of position j

y_{jk} 1 if player of position j is k^{th} batting order

$J = K = \{1, \ldots, 9\}$

$$\max \sum_{k \in K} \sum_{j \in J} O_{jk} y_{jk}$$

s.t.

$$\sum_{j \in J} y_{jk} = 1 \qquad \forall k \in K$$

$$\sum_{k \in K} y_{jk} = 1 \qquad \forall j \in J$$

$$y_{jk} \in \{0, 1\} \qquad \forall j \in J,\ k \in K$$

Bench Mark:

Stage 1:

每人守位：守備機會最多

選擇各守位 OPS+ max

Stage2:

OBP^{1st}、OBP^{2nd}：1、2 棒

$OPS+^{1st} \sim OPS^{3rd}$：3～5 棒

剩下按 OBP 由大到小排序