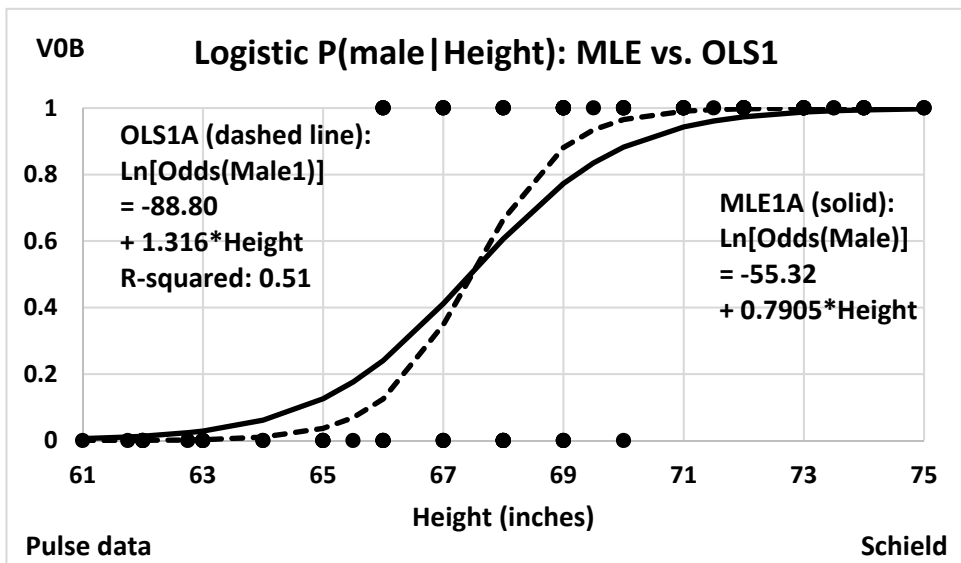**GOAL:**　　Model logistic relationship between height and chance of being male (versus female)

MODEL　　Logistic curve using Maximum Likelihood Estimation (MLE) versus Ordinary Least Squares (OLS)
　　　　　　　OLS1: Adjust 0/1 outcomes to 0.001/0.999 to avoid division by zero.
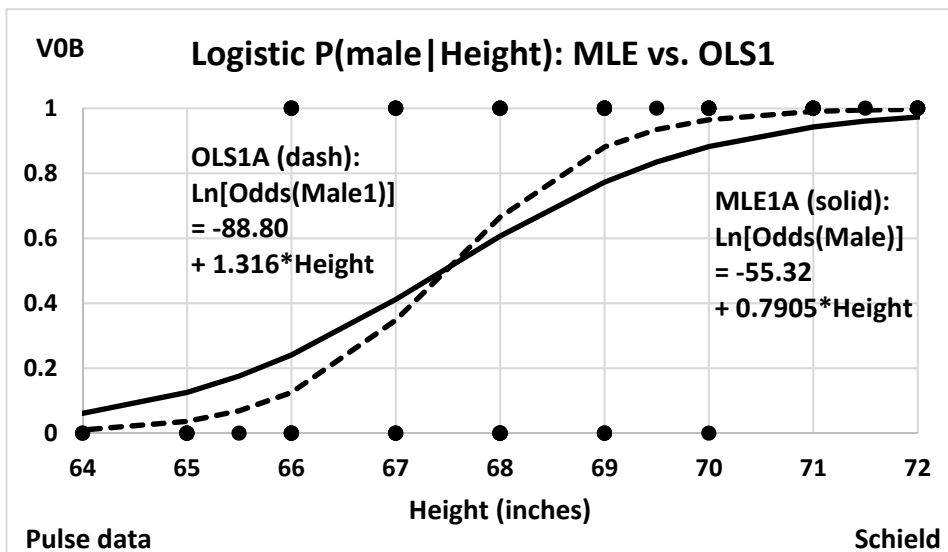
DATA　　OLS1A　　http://www.statlit.org/pdf/2015-Schield-Logistic-OLS1A-Excel2013-Demo.pdf
　　　　　　　MLE　　　http://www.statlit.org/pdf/2015-Schield-Logistic-MLE1A-Excel2013-Demo.pdf

RESULTS

		P(male)	Height
OLS1	ln(Odds(Male) = -88.80 + 1.316*Height	50%	67.477
MLE	ln(Odds(Male) = -53.32 + 0.7905*Height	50%	67.451

CONCLUSION　　　In this univariate logistic regression, OLS1 logistic is close to an MLE logistic.
　　　　　　　　　　　Closest near P(male) = 50%.
　　　　　　　　　　　Biggest difference is in the slope at P(male) = 50%.

V0B

Logistic P(male|Height): MLE vs. OLS1

OLS1A (dashed line):
Ln[Odds(Male1)]
= -88.80
+ 1.316*Height
R-squared: 0.51

MLE1A (solid):
Ln[Odds(Male)]
= -55.32
+ 0.7905*Height

Height (inches)

Pulse data　　　　　　　　　　　　　　　　　　　　Schield

CLOSEUP

V0B

Logistic P(male|Height): MLE vs. OLS1

OLS1A (dash):
Ln[Odds(Male1)]
= -88.80
+ 1.316*Height

MLE1A (solid):
Ln[Odds(Male)]
= -55.32
+ 0.7905*Height

Height (inches)

Pulse data　　　　　　　　　　　　　　　　　　　　Schield

GOAL: Model logistic relationship between weight and chance of being male (versus female)

MODEL   Logistic curve using Maximum Likelihood Estimation (MLE) versus Ordinary Least Squares (OLS)
OLS1: Adjust 0/1 outcomes to 0.001/0.999 to avoid division by zero.

DATA   OLS1B   http://www.statlit.org/pdf/2015-Schield-Logistic-OLS1B-Excel2013-Demo.pdf
MLE   http://www.statlit.org/pdf/2015-Schield-Logistic-MLE1B-Excel2013-Demo.pdf

RESULTS   P(male)   Weight
OLS1   ln(Odds(Male) = -27.57 + 0.2013*Weight   50%   136.960
MLE   ln(Odds(Male) = -21.48 + 0.1577*Weight   50%   136.218

CONCLUSION   In this univariate logistic regression, OLS1 logistic is a close to an MLE logistic.
Closest near P(male) = 50%.
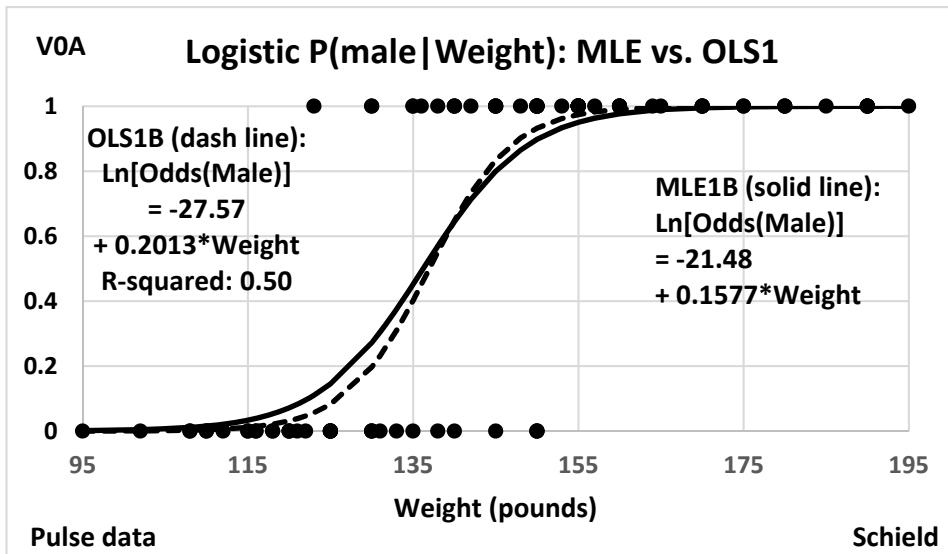Biggest difference is in the slope at P(male) = 50%.

CLOSEUP

Male Predicted by Height and Weight
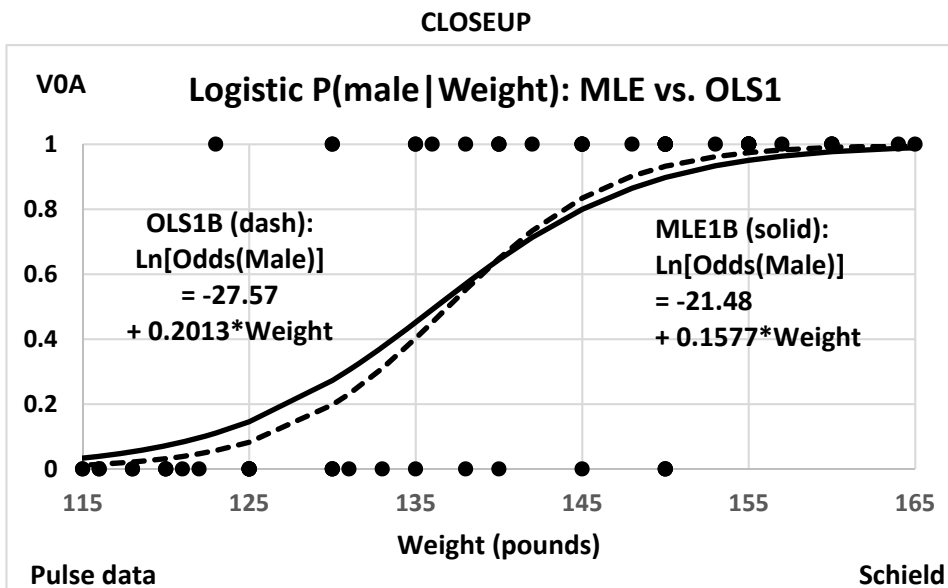
GOAL: Model logistic relationship between height and chance of being male after controlling for weight

MODEL   Logistic curve using Maximum Likelihood Estimation (MLE) versus Ordinary Least Squares (OLS)

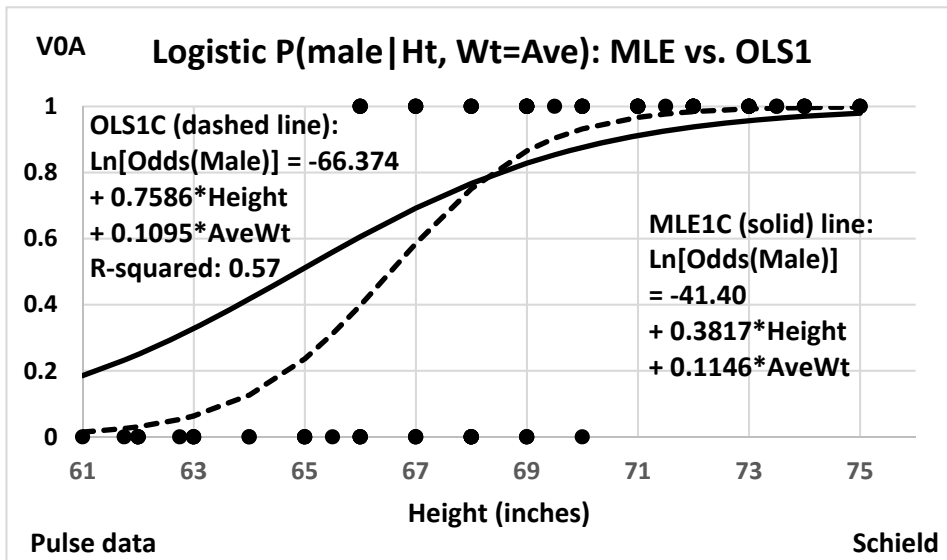OLS1: Adjust 0/1 outcomes to 0.001/0.999 to avoid division by zero.

DATA   OLS1C   http://www.statlit.org/pdf/2015-Schield-Logistic-OLS1C-Excel2013-Demo.pdf

              MLE   http://www.statlit.org/pdf/2015-Schield-Logistic-MLE1C-Excel2013-Demo.pdf

RESULTS

		P(male)	Height
OLS1	ln(Odds(Male)) = -66.374 + 0.7586*Height + 0.1095*Weight	50%	66.543
MLE	ln(Odds(Male)) = -41.40 + 0.3817*Height + 0.1146*Weight	50%	64.874

CONCLUSION

In this multivariate logistic regression, considerable difference between OLS1 and MLE.

X(Y = 50%|OLS1) = 66.54.   X(Y=50%|MLE) = 64.87

If higher accuracy is needed, use MLE or consult a statistician.

V0A — **Logistic P(male|Ht, Wt=Ave): MLE vs. OLS1**

OLS1C (dashed line):
Ln[Odds(Male)] = -66.374
+ 0.7586*Height
+ 0.1095*AveWt
R-squared: 0.57

MLE1C (solid) line:
Ln[Odds(Male)]
= -41.40
+ 0.3817*Height
+ 0.1146*AveWt

Height (inches)

Pulse data   Schield

CLOSEUP

V0A — **Logistic P(male|Ht, Wt=Ave): MLE vs. OLS1**

OLS1C (dashed line):
Ln[Odds(Male)]
= -66.374
+ 0.7586*Height
+ 0.1095*AveWt

MLE1C (solid line):
Ln[Odds(Male)]
= -41.40
+ 0.3817*Height
+ 0.1146*AveWt

Height (inches)

Pulse data   Schield