%% Model Statistic Function

% This MATLAB function conducts a statistical test to determine whether

% two means are significantly different while accounting for the

% standard deviation (i.e., variability) associated with each

% comparative mean.

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%% Function Built Based on the Following Reference:

% Bates BT, James CR, Dufek JS. Single Subject Analysis.

% In: N. Stergiou (Editor), Innovative Analyses of Human Movement.

% Champaign, IL: Human Kinetics; 2004. p. 3-28.

%% Function Inputs & Outputs

% Inputs:

% A: mean value from condition/participant 1 trials

% B: stdev associated with A

% a: mean value from condition/participant 2 trials

% b: stdev associated with a

% n1 = # of observations for 'A'

% n2 = # of observations for 'B';

% Output

% 1 = The difference is significant

% 0 = The difference is not significant

function h = modelstat(A,B,a,b,n1,n2)

% Mean Standard Deviation

MSD = sqrt(((B\*B)+(b\*b))/2);

% Mean Difference

MD = abs(A-a);

% Critical Value/Critical Difference

Crit\_Value\_Number = min(n1,n2); % extract fewest number of trials between n1 and n2

Crit\_Values = [0;0;1.6533;1.5058;1.3662;1.2408;1.1306;1.0351;0.9536;0.8857;0.8307;0.7867;0.7516;0.7234;0.7001;0.6798;0.6618;0.645;0.6311;0.6175];

% Crit\_Values are taken from Table 1.4 on pg 20 in the reference provided

% above

CV = Crit\_Values(Crit\_Value\_Number)\*MSD; % critical value-based difference

if Crit\_Value\_Number >20 & Crit\_Value\_Number <=25

CV = 0.5572\*MSD;

end

if Crit\_Value\_Number >25 & Crit\_Value\_Number <=30

CV = 0.5097\*MSD;

end

if Crit\_Value\_Number >30 & Crit\_Value\_Number <=35

CV = 0.4729\*MSD;

end

if Crit\_Value\_Number >35 & Crit\_Value\_Number <=40

CV = 0.4442\*MSD;

end

if Crit\_Value\_Number >40 & Crit\_Value\_Number <=45

CV = 0.4207\*MSD;

end

if Crit\_Value\_Number >45

CV = 0.4000\*MSD;

end

% Outcome of Test (Mean Difference vs. Critical Value-Based Difference)

if MD > CV

h = 1;

disp('The Difference Is Significant (p < 0.05)')

end

if MD <= CV

h = 0;

disp('The Difference Is Not Significant (p > 0.05)')

end

end