

average

January 22, 2026

## 1 Calculations around the format change in 3BLD from Bo3 to Bo5

With the [2026 regulations change](#), the format of the event 3BLD changed from Best of 3 (Bo3) to Best of 5 (Bo5). With that the also recognized average-style changed from Mean of 3 (Mo3) to Average of 5 (Ao5), with the key difference that for a Mo3 three successful attempts were needed and for a Ao5 only four successful attempts are needed, as the worst attempt (that may be a DNF or DNS) is not considered for calculating the Ao5. Another format change is the implementation of Dual Rounds, which for 3BLD consist of two Bo5 with two possibilities of achieving an Ao5.

### 1.1 Getting at least one success

For any given number of attempts  $n$ , the chance of getting at least one success  $P_{1+/n}$  is equivalent to the chance of not getting  $n$  unsuccessful attempts.  $p$  is the success rate of a competitor (the probability that an attempt is a success) under the assumption, that the probability for each attempt stays the same (no effects of getting tired or doing safety solves). The probability for at least one success out of  $n$  attempts is

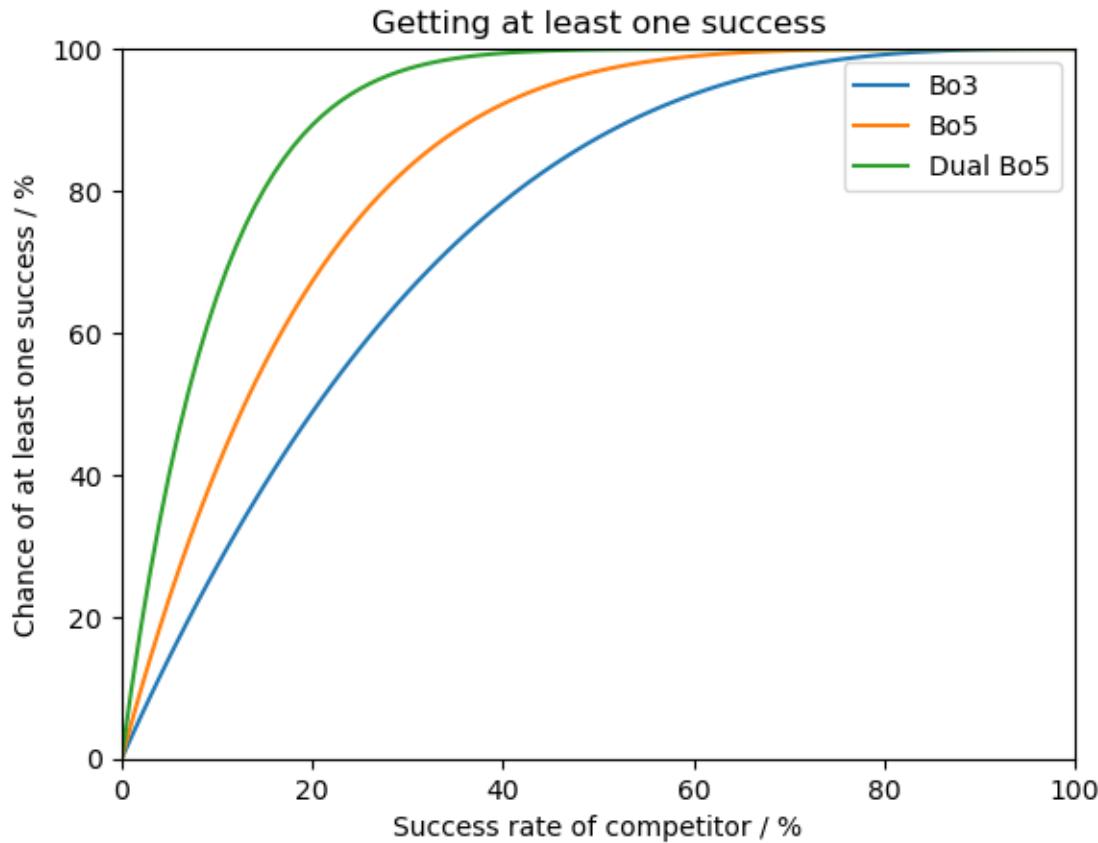
$$P_{1+/n} = 1 - (1 - p)^n.$$

```
[68]: import matplotlib.pyplot as plt
import numpy as np
x = np.linspace(0,1,101)
Bo3_sin = [(1 - ((1 - i) ** 3)) * 100 for i in x]
Bo5_sin = [(1 - ((1 - i) ** 5)) * 100 for i in x]
DualBo5_sin = [(1 - ((1 - i) ** 10)) * 100 for i in x]

fig, ax = plt.subplots()
plt.title('Getting at least one success')
ax.plot(range(0,101,1), Bo3_sin,label='Bo3')
ax.plot(range(0,101,1), Bo5_sin,label='Bo5')
ax.plot(range(0,101,1), DualBo5_sin,label='Dual Bo5')

ax.set_xlabel('Success rate of competitor / %')
ax.set_ylabel('Chance of at least one success / %')
ax.set_xlim(0, 100)
ax.set_ylim(0, 100)
```

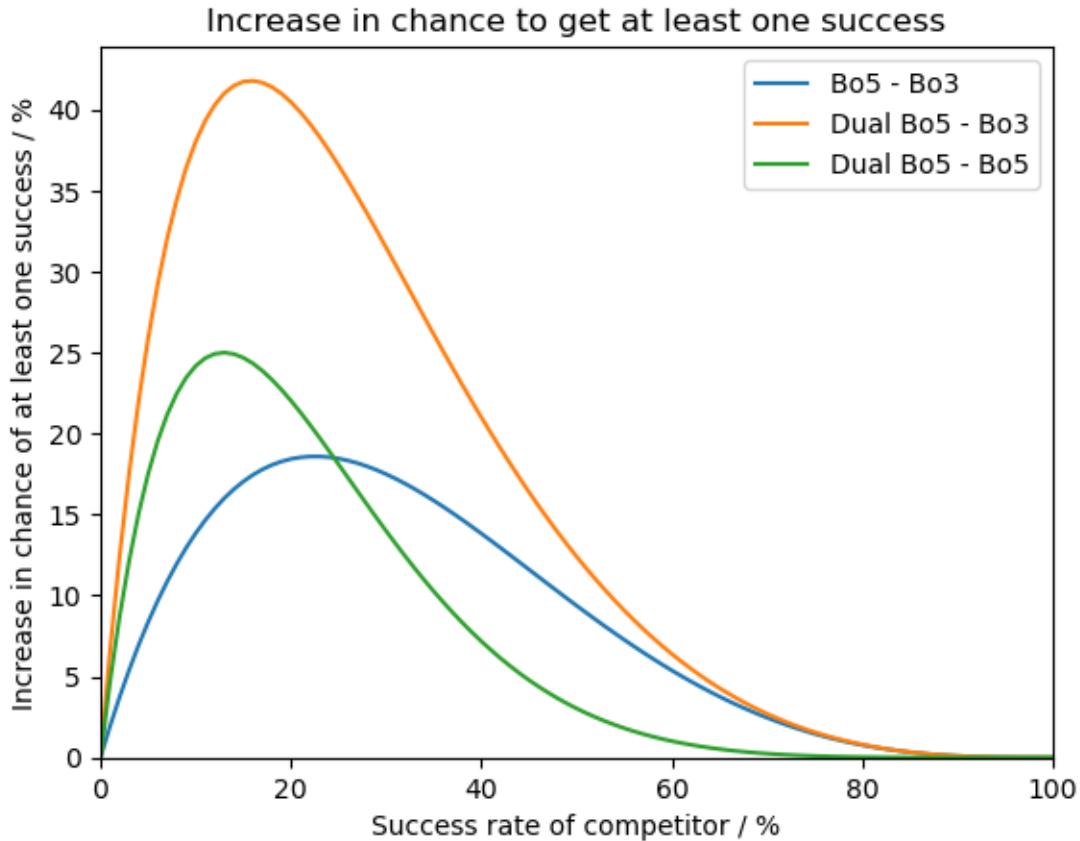
```
plt.legend()  
plt.show()
```



As expected the chance of getting at least one successful attempt increases with the number of attempts.

```
[69]: Delta_Bo5_Bo3_sin = [x-y for x,y in zip(Bo5_sin, Bo3_sin)]  
Delta_DualBo5_Bo3_sin = [x-y for x,y in zip(DualBo5_sin, Bo3_sin)]  
Delta_DualBo5_Bo5_sin = [x-y for x,y in zip(DualBo5_sin, Bo5_sin)]  
  
fig, ax = plt.subplots()  
plt.title('Increase in chance to get at least one success')  
ax.plot(range(0,101,1), Delta_Bo5_Bo3_sin,label='Bo5 - Bo3')  
ax.plot(range(0,101,1), Delta_DualBo5_Bo3_sin,label='Dual Bo5 - Bo3')  
ax.plot(range(0,101,1), Delta_DualBo5_Bo5_sin,label='Dual Bo5 - Bo5')  
  
ax.set_xlabel('Success rate of competitor / %')  
ax.set_ylabel('Increase in chance of at least one success / %')  
ax.set_xlim(0, 100)  
ax.set_ylim(0)
```

```
plt.legend()
plt.show()
```



Especially for competitors with lower success rates, the chances to achieve at least one success drastically increase by the format change to Bo5. The Bo5 increases the chance up to 18.6 % for competitors with a success rate of  $\approx 22.5\%$ . The Dual Bo5 increases the chance up to 41.8 % (for  $p \approx 15.8\%$ ) compared to the Mo3 and 25 % (for  $p \approx 12.9\%$ ) compared to the Bo5.

## 1.2 Getting a Mo3 vs. getting an Ao5

This calculation was presented by Sebastiano Tronto [here](#). The probability of getting a Mo3 (3 successful attempts out of 3 attempts)  $P_{\text{Mo3}}$  is

$$P_{\text{Mo3}} = p^3.$$

The probability of getting an Ao5  $P_{\text{Ao5}}$  is the probability of getting 4 successful attempts and one unsuccessful attempt (in any order) plus the chance of getting 5 successful attempts

$$P_{\text{Ao5}} = P_{4/5} + P_{5/5} = 5p^4(1-p) + p^5.$$

By solving the inequation

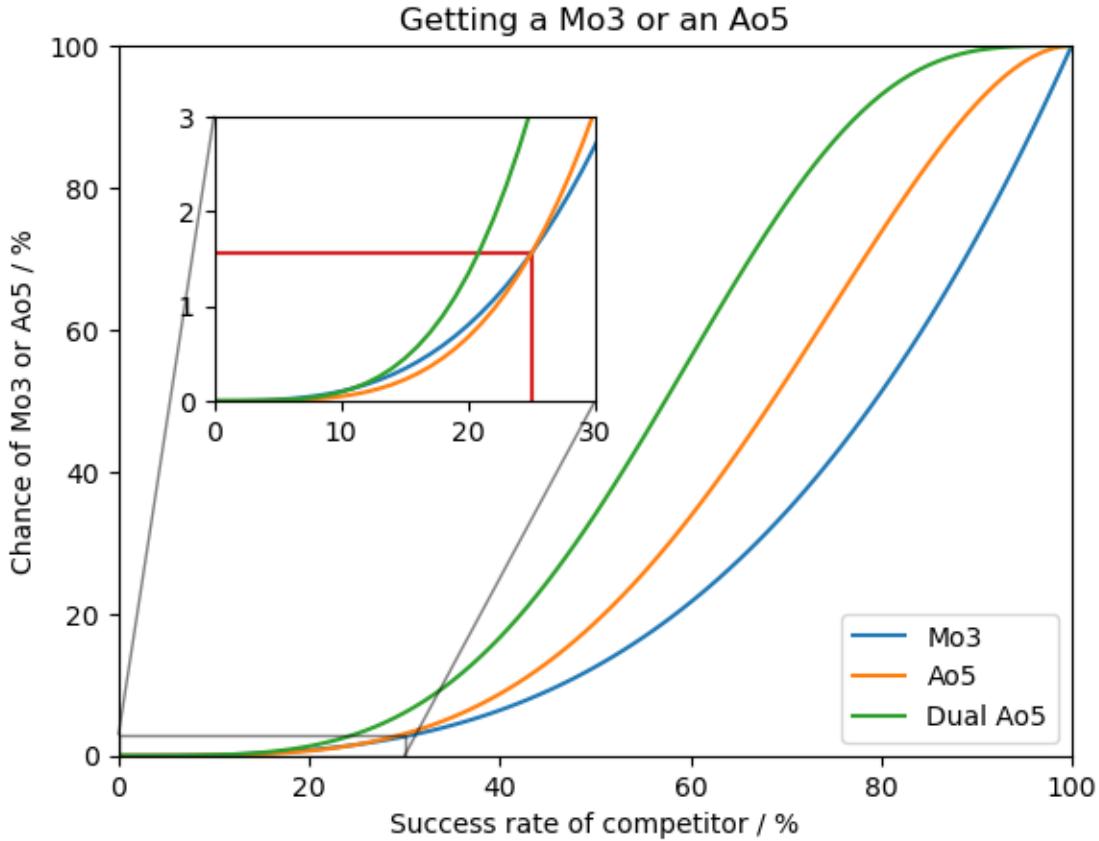
$$P_{\text{Ao5}} \geq P_{\text{Mo3}}$$

it is found that for  $p > 25\%$  the chance of getting an Ao5 is greater than the probability of getting an Mo3. However this calculation leads to the question how big the disadvantage for competitors with  $p < 25\%$  is.

```
[ ]: def p_ao5(p):
    return (5 * p **4 * (1 - p) + p**5)
Mo3_avg = [(i ** 3) * 100 for i in x]
Ao5_avg = [p_ao5(i) * 100 for i in x]
DualAo5_avg = [(2*p_ao5(i)*(1-p_ao5(i))+(p_ao5(i)**2)) * 100 for i in x]
fig, ax = plt.subplots()
plt.title('Getting a Mo3 or an Ao5')
ax.plot(range(0,101,1), Mo3_avg,label='Mo3')
ax.plot(range(0,101,1), Ao5_avg,label='Ao5')
ax.plot(range(0,101,1), DualAo5_avg,label='Dual Ao5')
axins=ax.inset_axes([0.1,0.5,0.4,0.4])
axins.plot([25,25],[0,1.5625],color='tab:red')
axins.plot([0,25],[1.5625,1.5625],color='tab:red')
axins.plot(range(0,101,1), Mo3_avg)
axins.plot(range(0,101,1), Ao5_avg)
axins.plot(range(0,101,1), DualAo5_avg)

ax.set_xlabel('Success rate of competitor / %')
ax.set_ylabel('Chance of Mo3 or Ao5 / %')
ax.set_xlim(0, 100)
ax.set_ylim(0, 100)
axins.set_xlim(0, 30)
axins.set_ylim(0, 3)
ax.indicate_inset_zoom(axins,edgecolor='black')

plt.legend()
plt.show()
```



For all success rates over 25 % the chance of achieving an Ao5 is higher than the chance of achieving an Mo3. For success rates below 25 % the chance of achieving a Mo3 is higher than the chance of achieving an Ao5 by a very small amount. A Dual Round increases the chances of achieving at least one Ao5 further for all competitors with success rates > 11.0 %.

## 2 Difference between Mo3 and Ao5

```
[71]: Delta_Ao5_Mo3 = [x-y for x,y in zip(Ao5_avg, Mo3_avg)]
Delta_DualAo5_Mo3 = [x-y for x,y in zip(DualAo5_avg, Mo3_avg)]
Delta_DualAo5_Ao5 = [x-y for x,y in zip(DualAo5_avg, Ao5_avg)]

fig, ax = plt.subplots()
plt.title('Comparison of chances to get an Mo3 or Ao5')
ax.plot([0,100],[0,0],color='tab:red')
ax.plot(range(0,101,1), Delta_Ao5_Mo3,label='Mo3 - Ao5')
ax.plot(range(0,101,1), Delta_DualAo5_Mo3,label='Mo3 - Dual Ao5')
ax.plot(range(0,101,1), Delta_DualAo5_Ao5,label='Ao5 - Dual Ao5')

axins=ax.inset_axes([0.1,0.2,0.3,0.3])
axins.plot([0,100],[0,0],color='tab:red')
```

```

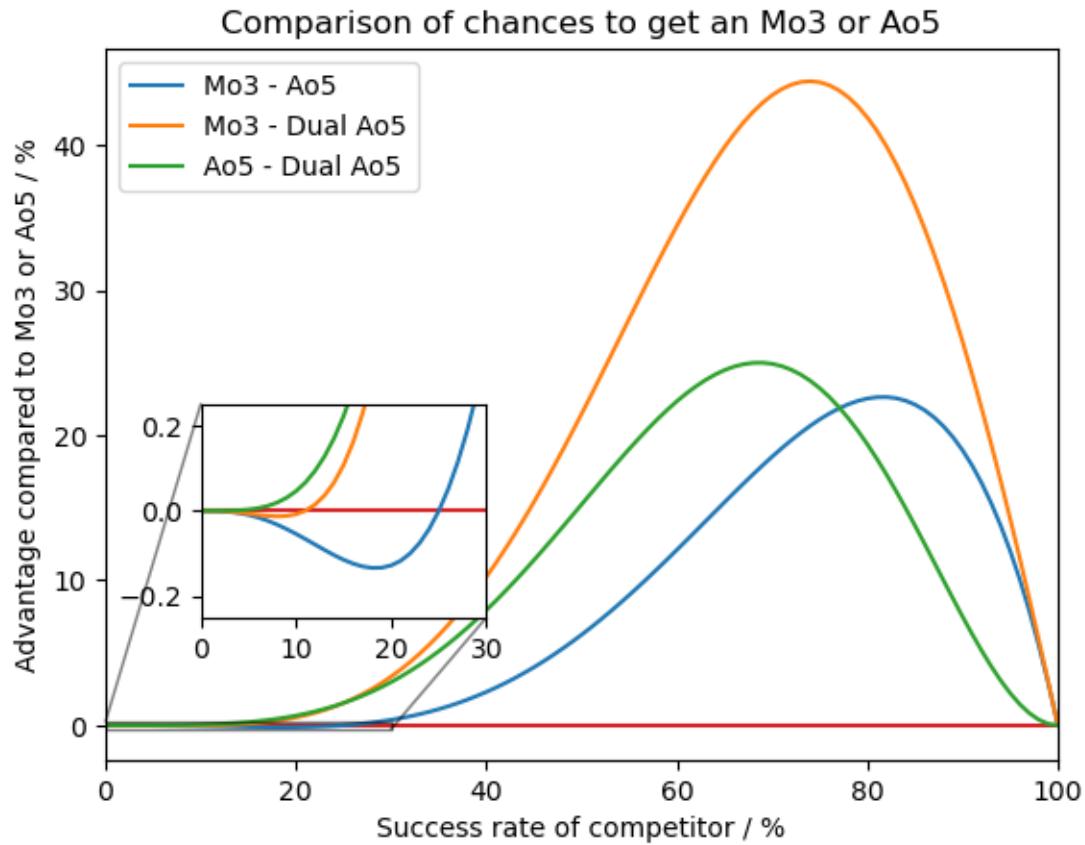
axins.plot(range(0,101,1), Delta_Ao5_Mo3)
axins.plot(range(0,101,1), Delta_DualAo5_Mo3)
axins.plot(range(0,101,1), Delta_DualAo5_Ao5)

ax.set_xlabel('Success rate of competitor / %')
ax.set_ylabel('Advantage compared to Mo3 or Ao5 / %')
ax.set_xlim(0, 100)
axins.set_xlim(0, 30)
axins.set_ylim(-0.25, 0.25)

ax.indicate_inset_zoom(axins,edgecolor='black')

plt.legend()
plt.show()

```



For competitors with success rates > 25 % the Ao5 is advantageous compared to the Mo3, with a maximum increase in chance of around 22,6 % for competitors with a success rate of around 81,6 %. For competitors with success rates < 25 % it is disadvantageous with a maximum decrease in chance of 0,13 % for competitors with a success rate of 18,4 %.

For competitors with success rates  $> 11\%$  the Dual Bo5 is advantageous compared to the Mo3, with a maximum increase in chance of around 44.4% for competitors with a success rate of around 73.9%. For competitors with success rates  $< 11\%$  it is disadvantageous with a maximum decrease in chance of 0,013% for competitors with a success rate of 8,2%.

The Dual Bo5 increases the chance to achieve at least one Ao5 for all competitors compared to just one Bo5. The maximum increase in chance compared to just one Bo5 is 25% for competitors with success rates of 68.6%.