

Prior Flight and Simulator Experience as Predictors of Naval Aviation Selection Test and Training Performance

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Naval Aviation Selection and Training

1. How are naval aviation students currently selected?
2. What is the Performance-Based Measurement (PBM) test and what does the PBM assess?
3. How might students' flight or flight simulator experience affect their scores on the PBM?
4. Does flight or simulator gaming experience influence students' performance in naval flight training?
5. Are score corrections for flight or simulator gaming experience necessary for the PBM?





- Aviation Selection Test Battery (ASTB)

- Primary tool for selecting student pilots (SPs) and student flight officers (SFOs) for the USN, USMC, and USCG
- First implemented in 1942 (revised in '53, '71, and '92)
 - Math skills
 - Reading comprehension
 - Mechanical comprehension
 - Spatial apperception
 - Aviation / nautical information
 - Aviation supplemental
 - Biographical inventory (suspended in 2002)
- Paper-and-pencil and online formats (via APEX.NET)



PBM Test

- Performance-Based Measurement (PBM) test

- Psychomotor test developed to expand selection criteria beyond knowledge, skills, and abilities assessed by ASTB


<u>Tasks</u>		<u>KSAs</u>	
▪ Direction orientation		▪ Information processing	
▪ Dichotic listening		▪ Spatial orientation	
▪ Single-axis tracking		▪ Physical dexterity	
▪ Dual-axis tracking		▪ Divided attention	
▪ Emergency scenario		▪ Task prioritization	
▪ Combos of above		▪ Decision-making	

- Administered via APEX.NET (requires Internet, headphones, and USB-enabled stick/throttle peripherals)



Direction Orientation Task

Tracker Map



Heading: 180

Camera View

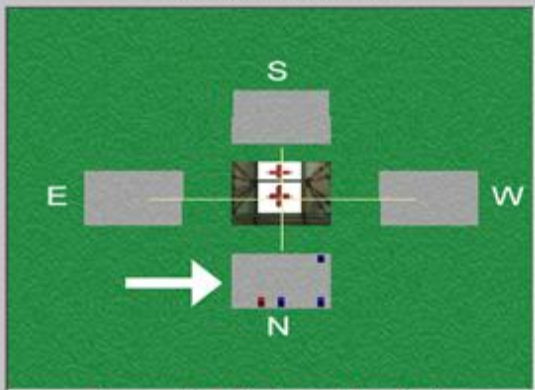


Image the North parking lot.

<< BackContinue >>

When you hear which parking lot to image you must move the mouse pointer over that parking lot and click the left mouse button. While North is always at the top of your Tracker Map, this is not always true for the Camera View. You must orient the Camera View with the top representing the direction the UAV is heading.



Dichotic Listening Task

“R 8 N S A 2 G B 7 F L 6”

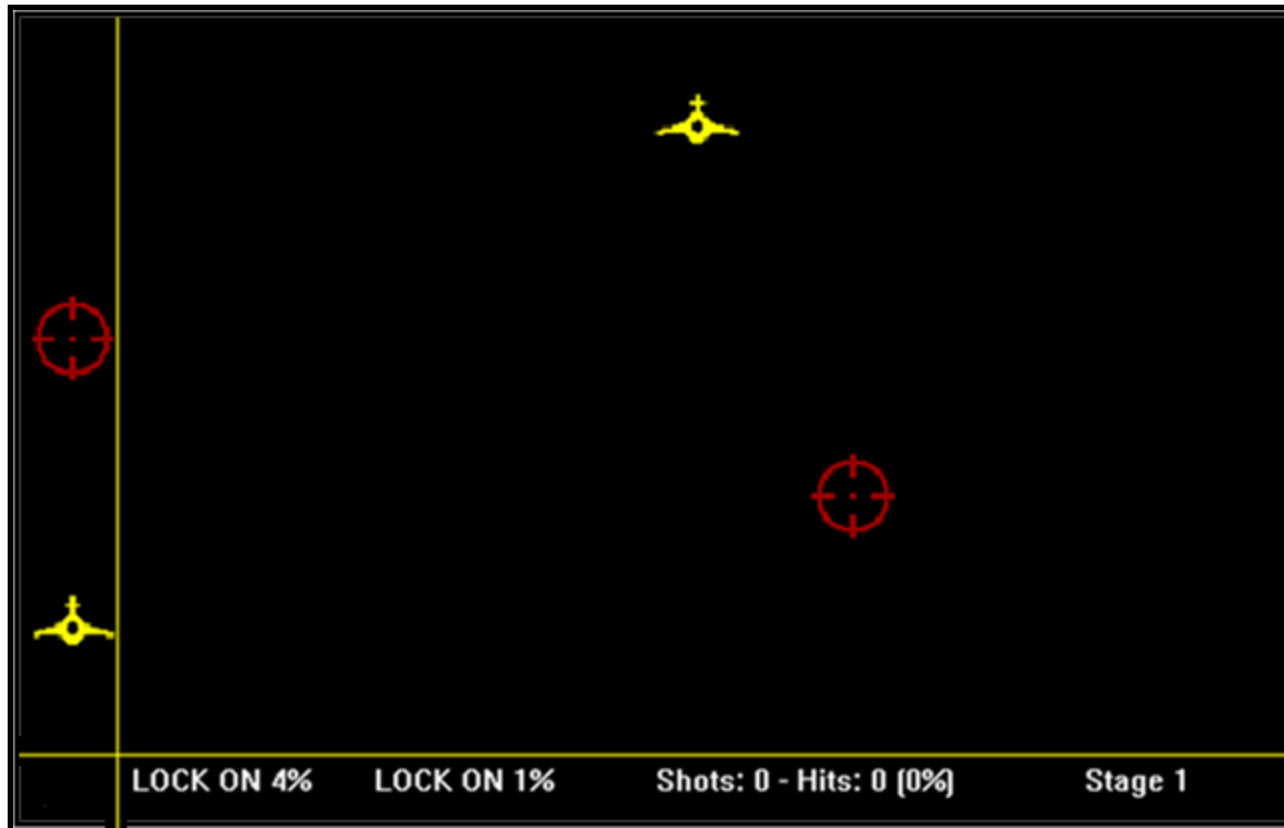
“Y L 3 S R 4 Z 9 X F 8 G”

Left Ear

Right Ear



Tracking Tasks



Research Questions

1. Does prior flight experience influence PBM or flight training performance?



2. Does prior flight simulator gaming experience influence PBM or flight training performance?



Demographic Items

- Prior flight experience
 - To the best of your knowledge, how many hours of flight time do you have? (open-ended; force-categorized)
- Simulator gaming experience
 - Rate your experience with flight simulator games or software (none, novice, intermediate, expert)



Analyses

- Separate analyses conducted for SPs and SFOs
 - Examined correlations between prior flight experience (or simulator experience) and PBM (or flight training) scores
 - Conducted ANOVAs to examine mean score differences and data trends by prior flight and simulator experience categories



Student Pilot Results

	Flight hours (continuous)	Flight hours (categorized)	Simulator gaming	PBM score	Flight training
Flight hours (continuous)	1				
Flight hours (categorized)	.50 ^{**}	1			
Simulator/gaming	.18 ^{**}	.35 ^{**}	1		
PBM score	-.03	.07	.35 ^{**}	1	
Flight training grade	.09 [*]	.17 ^{**}	.19 ^{**}	.36 ^{**}	1

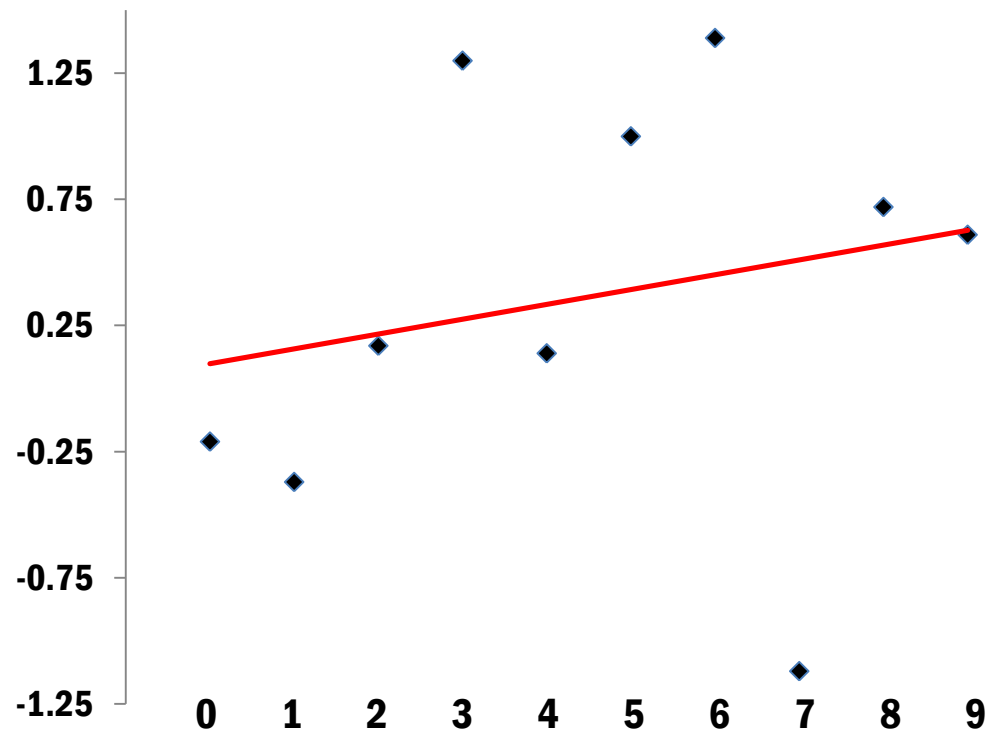
Flight experience: not correlated with PBM; significant positive correlation with flight training grade

Simulator experience: significant positive correlation with PBM and flight training grade



Student Pilot Results

Flight experience (X-axis)	N=632	Mean (sd) PBM score (Y-axis)
0 = 0 hours	356	-.21 (3.6)
1 = 1-5	31	-.37 (3.5)
2 = 6-10	15	.17 (4.5)
3 = 11-20	11	1.30 (4.4)
4 = 21-40	136	.14 (3.6)
5 = 41-60	16	1.00 (2.8)
6 = 61-80	14	1.39 (4.8)
7 = 81-100	10	-1.12 (3.3)
8 = 101-200	21	.72 (3.7)
9 = 201+	22	.61 (4.7)

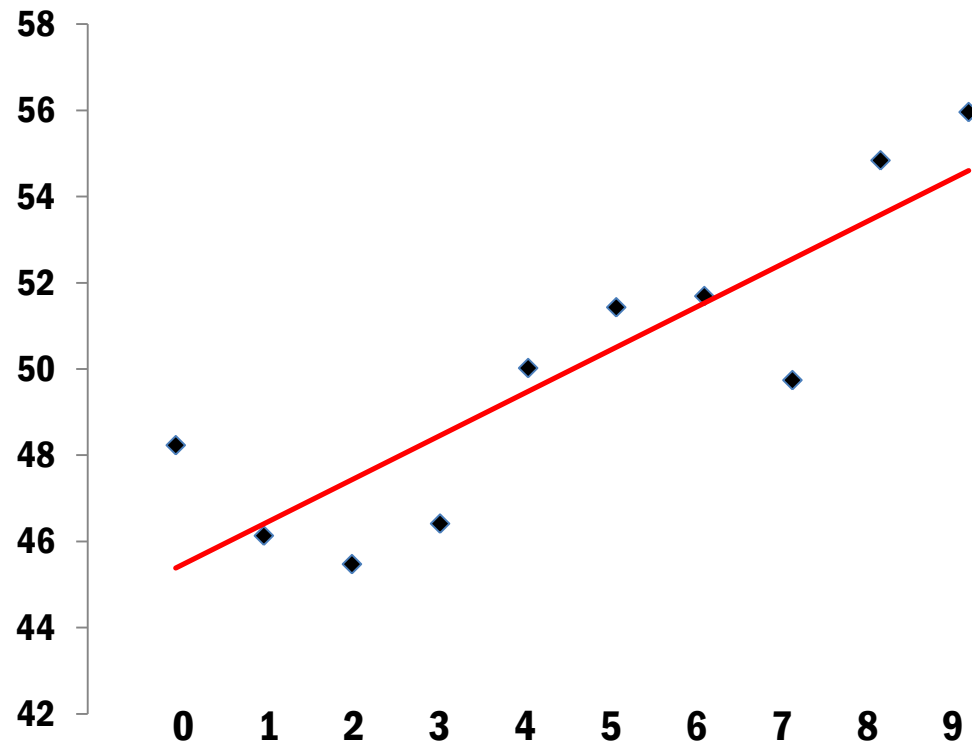


No clear relationship between flight experience and PBM performance



Student Pilot Results

Flight experience (X-axis)	N=629	Mean (sd) flight training score (Y-axis)
0 = 0 hours	355	48.23 (10.5)
1 = 1-5	31	46.13 (9.3)
2 = 6-10	14	45.47 (15.1)
3 = 11-20	11	46.41 (11.3)
4 = 21-40	136	50.02 (9.3)
5 = 41-60	16	51.43 (13.3)
6 = 61-80	14	51.69 (12.2)
7 = 81-100	10	49.74 (12.1)
8 = 101-200	21	54.84 (9.3)
9 = 201+	21	55.96 (10.0)

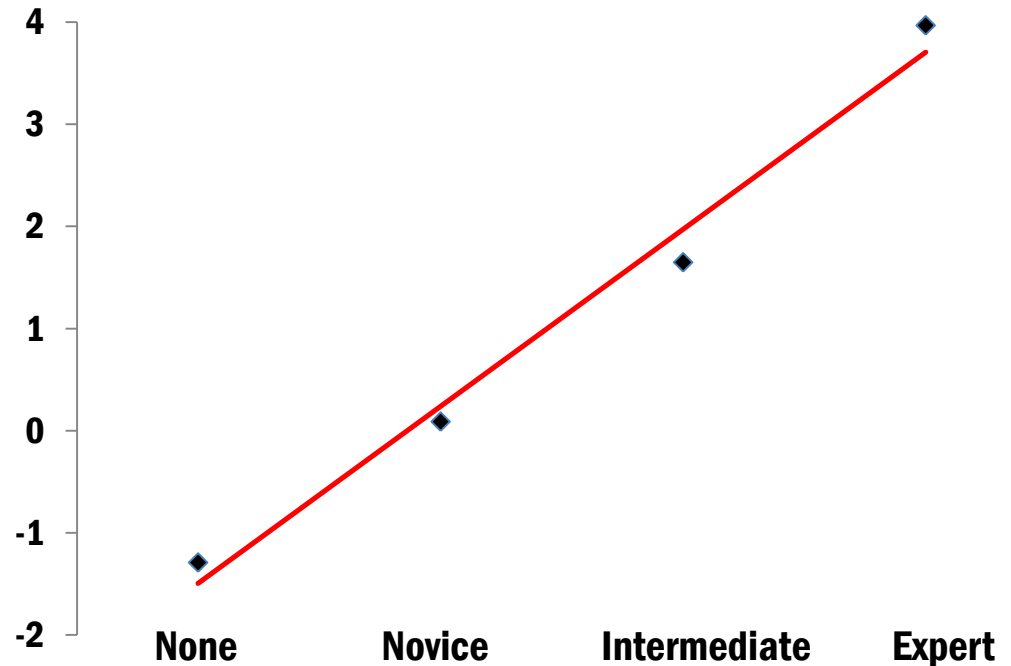


Clear positive trend between flight experience and flight training grade



Student Pilot Results

Simulator/ gaming exp. (X-axis)	N=632	Mean (sd) PBM score (Y-axis)
None	254	-1.29 (3.5)
Novice	220	.09 (3.6)
Intermediate	137	1.65 (3.3)
Expert	21	3.97 (4.8)

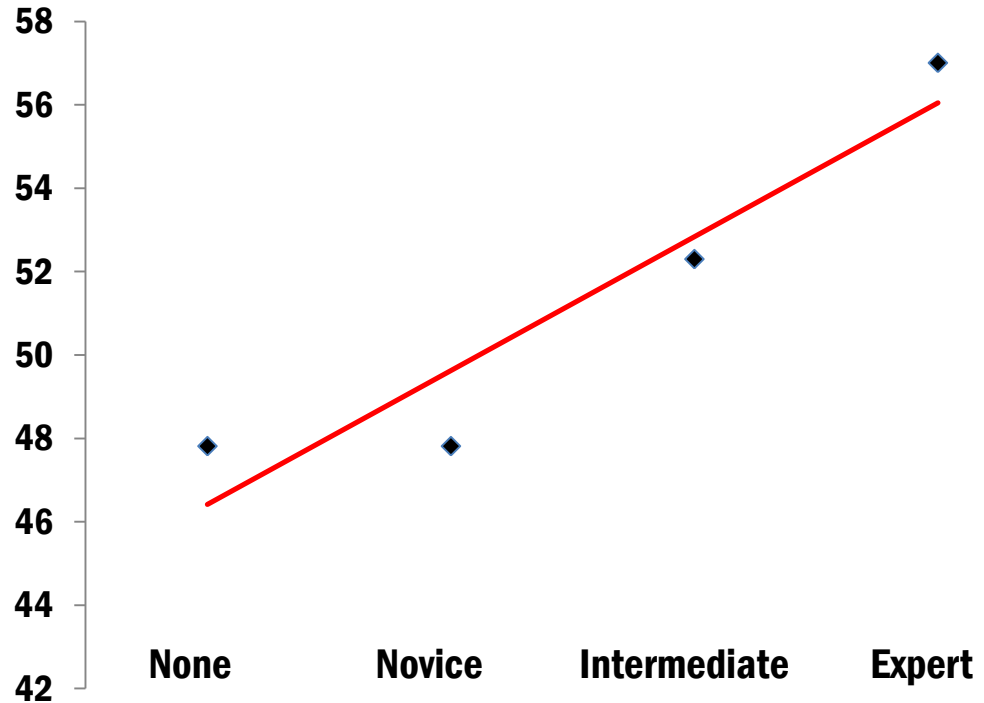


Clear positive trend between flight simulator experience and PBM performance



Student Pilot Results

Simulator/ gaming exp. (X-axis)	N=629	Mean (sd) flight training grade (Y-axis)
None	255	47.81 (9.7)
Novice	218	47.81 (10.8)
Intermediate	135	52.30 (10.7)
Expert	21	57.01 (9.5)



Clear positive trend between flight simulator experience and flight training grade



Student Flight Officer Results

	Flight hours (continuous)	Flight hours (categorized)	Simulator gaming	PBM score	Flight training
Flight hours (continuous)	1				
Flight hours (categorized)	.47 ^{**}	1			
Simulator/gaming	.10	.23 ^{**}	1		
PBM score	.02	.00	.18 ^{**}	1	
Flight training grade	.10	.14 [*]	.13	.29 ^{**}	1

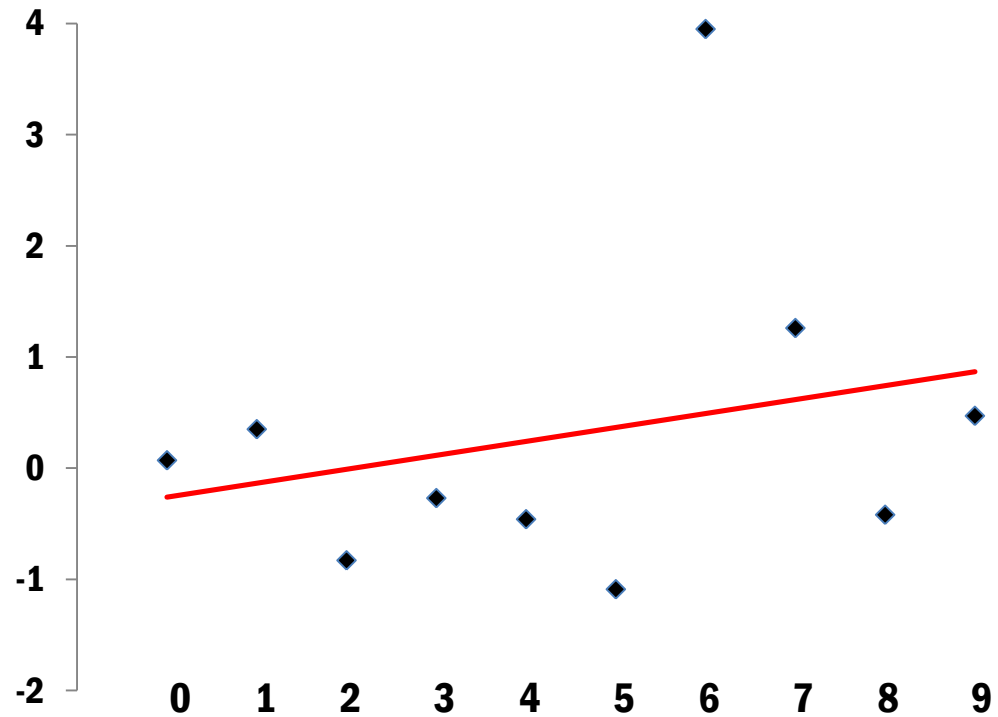
Flight experience: not correlated with PBM; significant positive correlation with flight training grade (categorized only)

Simulator experience: significant positive correlation with PBM; correlation with flight training grade was non-significant ($r=.13$, $p=.051$)



Student Flight Officer Results

Flight experience (X-axis)	N=230	Mean (sd) PBM score (Y-axis)
0 = 0 hours	151	.07 (3.4)
1 = 1-5	9	.35 (3.8)
2 = 6-10	5	-.83 (3.2)
3 = 11-20	8	-.27 (4.0)
4 = 21-40	10	-.46 (2.9)
5 = 41-60	2	-1.09 (2.8)
6 = 61-80	3	3.95 (1.4)
7 = 81-100	3	1.26 (3.2)
8 = 101-200	4	-.42 (3.1)
9 = 201+	5	.47 (2.8)

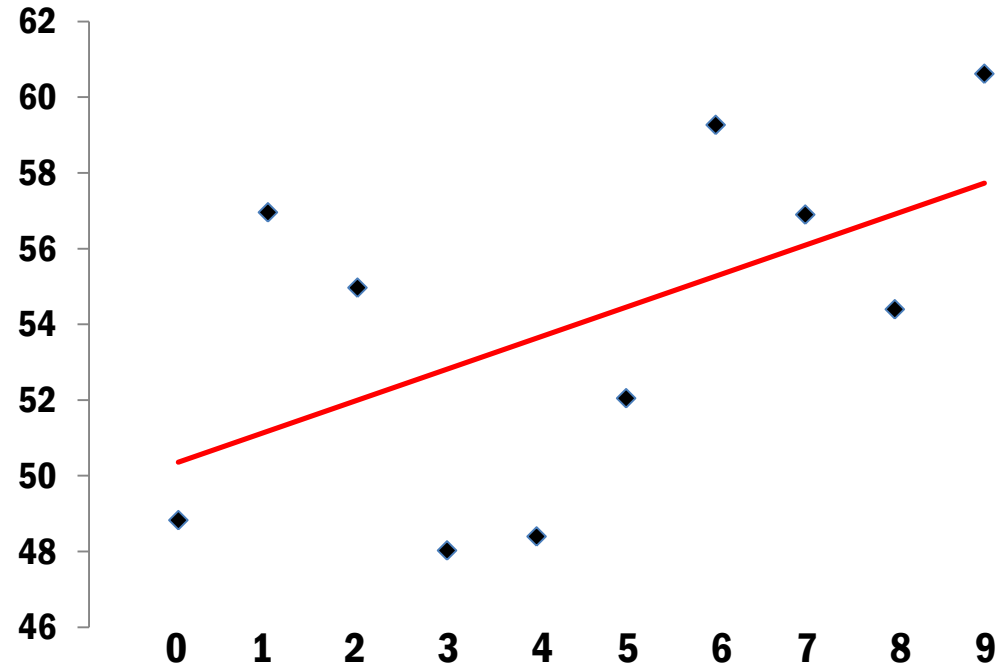


No clear relationship between flight experience and PBM performance



Student Flight Officer Results

Flight experience (X-axis)	N=230	Mean (sd) flight training grade (Y-axis)
0 = 0 hours	151	48.83 (11.2)
1 = 1-5	9	56.96 (10.2)
2 = 6-10	5	54.97 (9.4)
3 = 11-20	8	48.03 (9.2)
4 = 21-40	10	48.40 (11.2)
5 = 41-60	2	52.05 (9.3)
6 = 61-80	3	59.27 (4.1)
7 = 81-100	3	56.90 (13.6)
8 = 101-200	4	54.40 (18.2)
9 = 201+	5	60.62 (12.5)

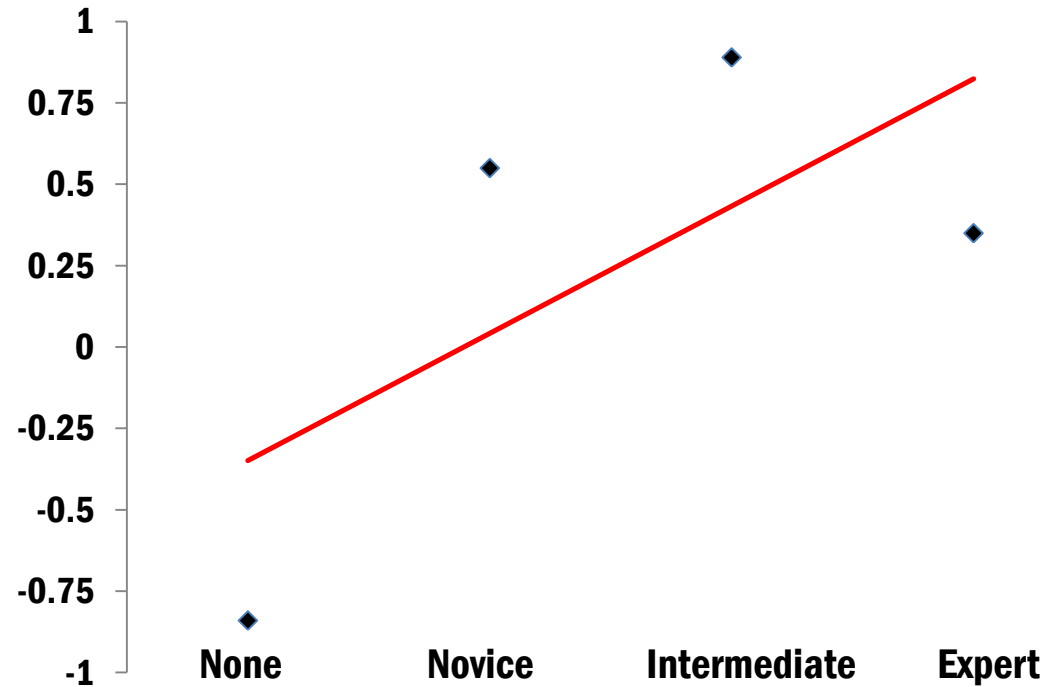


Slight positive trend between flight experience and flight training grade



Student Flight Officer Results

Simulator/ gaming exp. (X-axis)	N=230	Mean (sd) PBM score (Y-axis)
None	96	-.84 (3.5)
Novice	96	.55 (3.0)
Intermediate	28	.89 (3.1)
Expert	10	.35 (3.8)

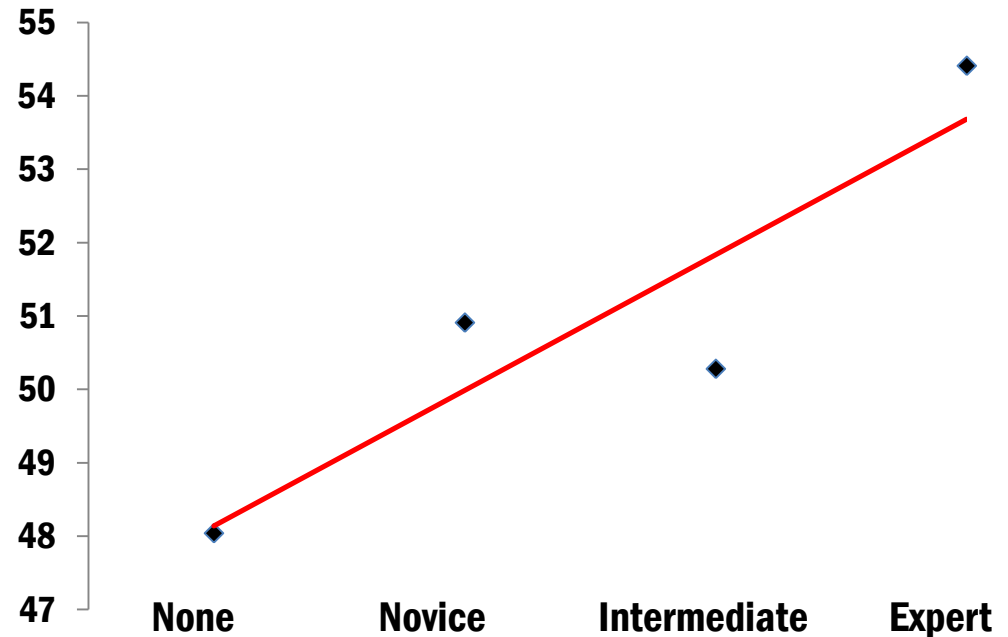


Clear positive trend between flight simulator experience and PBM performance



Student Flight Officer Results

Simulator/ gaming exp. (X-axis)	N=230	Mean (sd) flight training grade (Y-axis)
None	96	48.04 (12.1)
Novice	96	50.91 (10.6)
Intermediate	28	50.28 (9.1)
Expert	10	54.41 (14.5)



Clear positive trend between flight simulator experience and flight training grade



Summary

- Flight experience did not influence SPs' performance on the PBM. However, SPs with increased hours of flight experience tended to grade better in flight training.
- Having flight experience did not influence SFOs' scores on the PBM and only marginally predicted their grades in flight training.
- SPs with flight simulator experience performed better on both the PBM and in flight training than did non-experienced gamers.
- SFOs with simulator experience performed better on the PBM and slightly better in flight training than did non-experienced gamers.



Implications

- Students (SPs and SFOs) with flight experience tended to score better in naval flight training than those without such experience. Future naval aviation students are therefore encouraged to seek flight training opportunities prior to joining naval flight school.
- However, the non-significant relationship between students' flight experience and PBM scores indicates that having increased flight experience does not guarantee a passing selection test score.



Implications

- Students (SPs and SFOs) with flight simulator experience tended to do better on both the PBM and in flight training. However, this does not mean that gaming *causes* increased performance on these measures. It could be that gifted aviators simply gravitate toward flight simulator experiences more than others.



Implications

- These results suggest that neither flight nor simulator gaming experiences produce an unfair advantage for students on the PBM.
- Based on these findings, statistical controls for flight or flight simulator experiences are not required in scoring the PBM.

Bonus: the significant, positive correlations between SP's and SFO's PBM scores and their flight training grades ($.36^{**}$ and $.29^{**}$) support the use of the PBM in selecting naval aviation students.

