TNB – Combined metrics

Content:

- LISAS, IES and RCS calculations for each subtest divided by age ↗
- Box plots for each metric with each subtest ↗
- Correlation matrices of each of the metrics between subtests ↗

To make the visualization easier, the RT and Accuracy slides from the previous presentation were also included.

The first slides include important considerations to better understand the analysis.

Bin Scores

I understood from Huges et al. (2014) and Vandierendonck (2017) that bin scores are used in the task-switching paradigm. Since, as I understand it, the TNB is not a task-switching test, I could not calculate bin scores. Even though I tried, I found some variables required to calculate this metric impossible to obtain. For example:

"Its calculation, as defined in Hughes et al. (2014), assumes that there are two conditions, basically a control and an experimental condition (e.g., task repetition and task switch trials to estimate the task switch cost)"

Vandierendonck (2017)

Does our test have control conditions?

LISAS

"If the number of observations per condition is too small, more stable estimates of the standard deviation can be obtained by grouping conditions, or by taking the standard deviation per subject. In the present paper, the standard deviations are calculated per condition"

Vandierendonck (2018)

I **did not** do this because:

- 10 observations/condition seemed ok
- I did not find a proper grouping strategy (I can easily do this if we find one)

"General" and "When accurate"

*"RT_j is the participant's mean RT in condition j, ..., S_{RT} is the participant's **overall** RT standard deviation"*

Vandierendonck (2017)

*"the average **correct** RT (RTc)"*

*"S_{RT} refers to the standard deviation of the **correct** RTs"*

Vandierendonck (2018)

Because of this difference, you will find "General" and "When accurate" in LISAS plots. The same happened with IES.

Dots Comparison

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	6944,367	3961,216	3587,137	3367,666
LISAS when accurate	6674,142	3856,472	3581,53	3370,423
IES	4664,131	2912,606	2630,999	2452,991
IES when accurate	4582,063	2936,076	2638,374	2478,269
RCS	0,302176	0,506873	0,445771	0,48191
Accuracy	0,91875	0,9575	0,968421	0,975
RT	4286,538	2769,851	2539,811	2381,333

Dots Comparison

LISAS by age
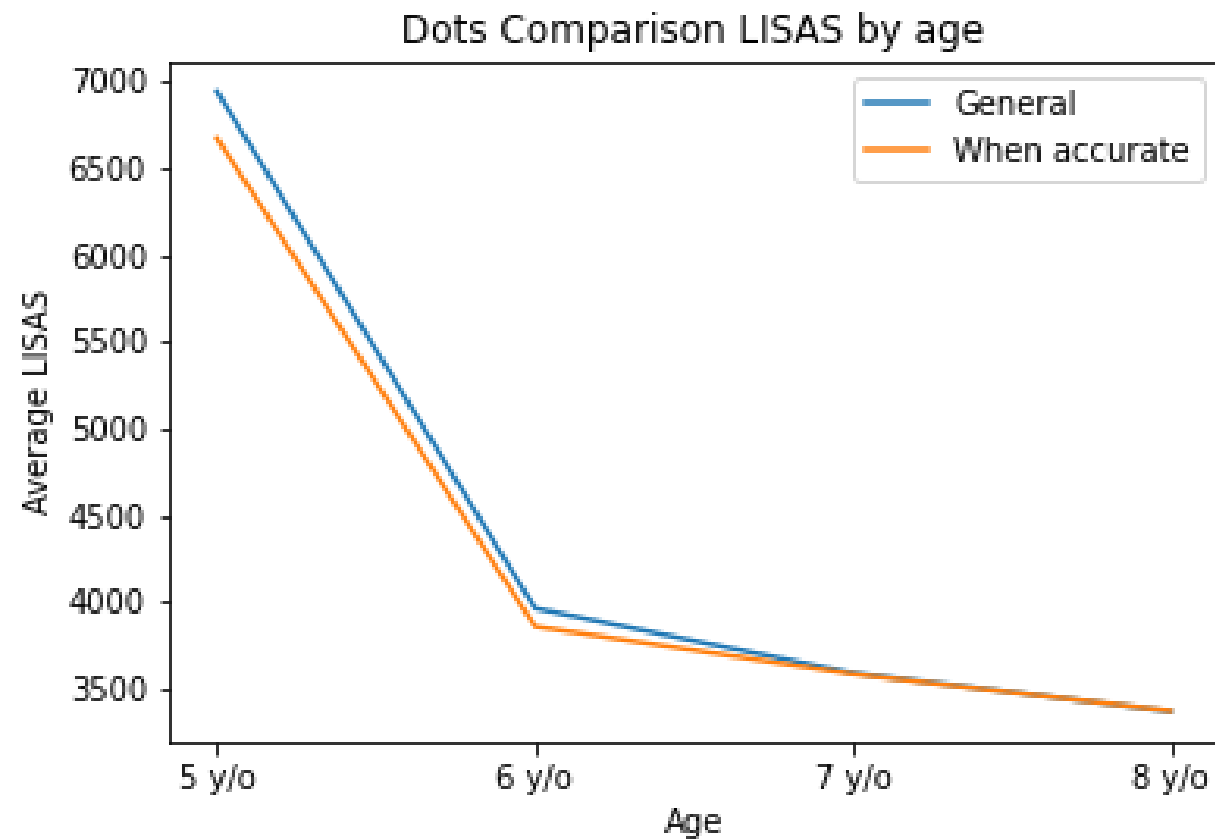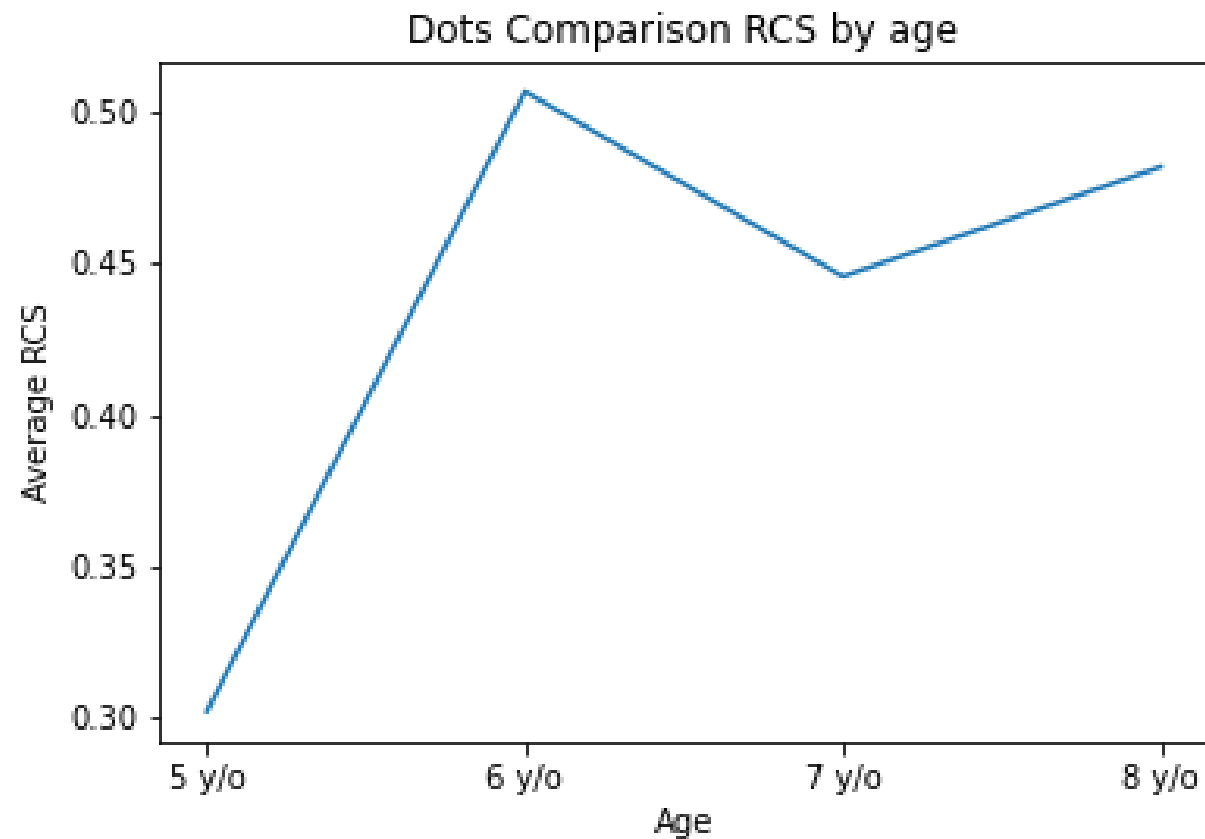
Dots Comparison

IES by age

Dots Comparison
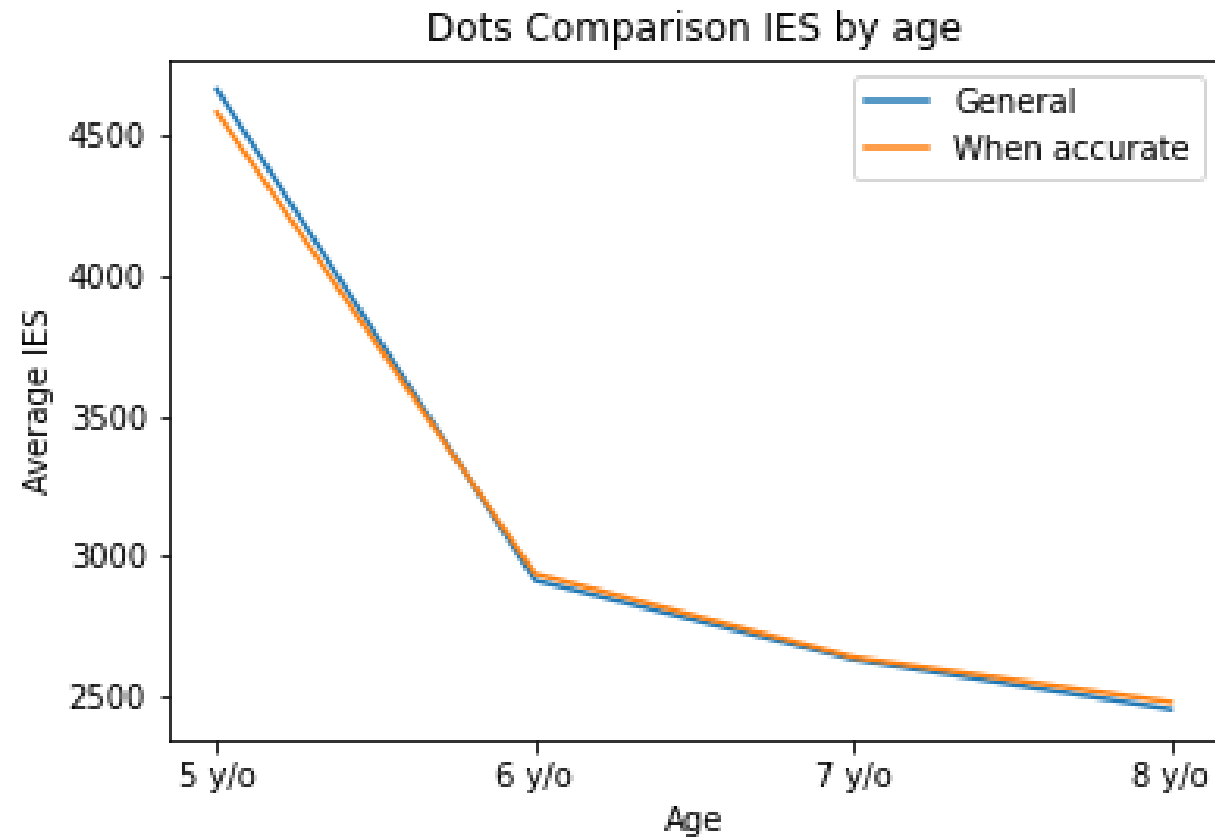
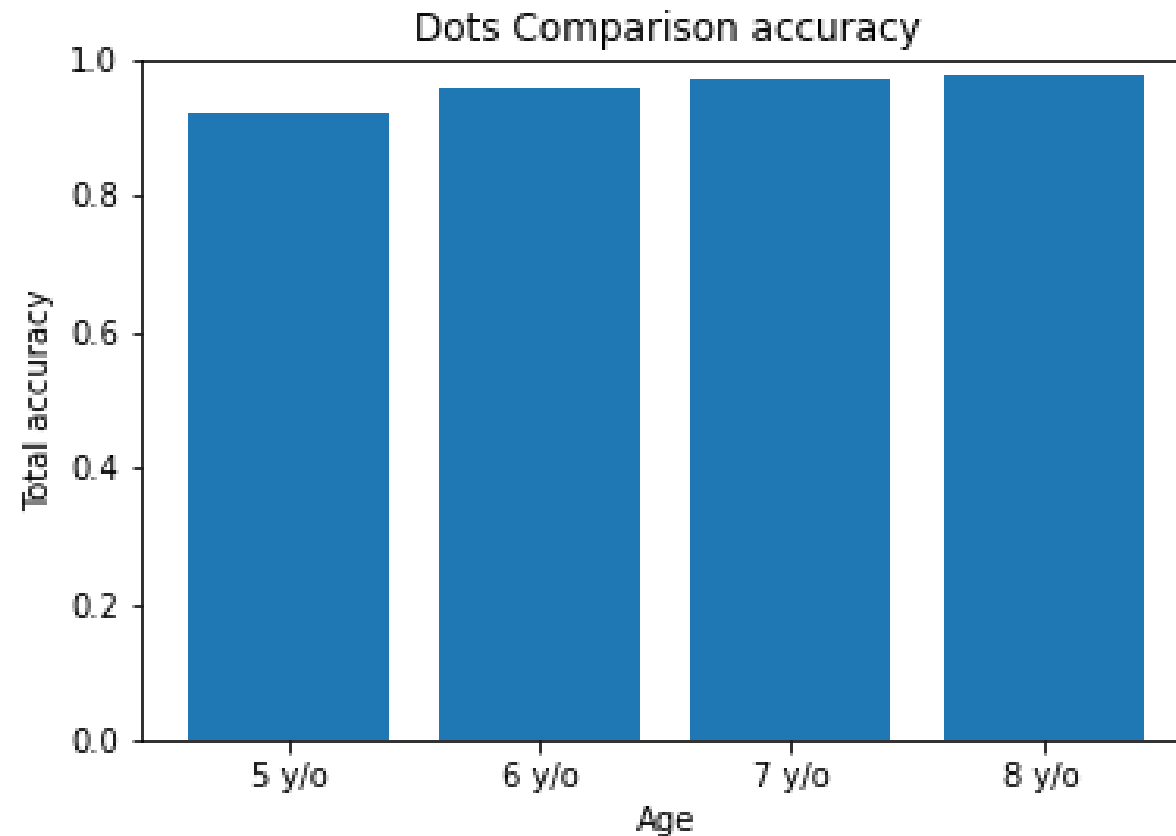## RCS by age

Dots Comparison RCS by age

Dots Comparison

RT by age
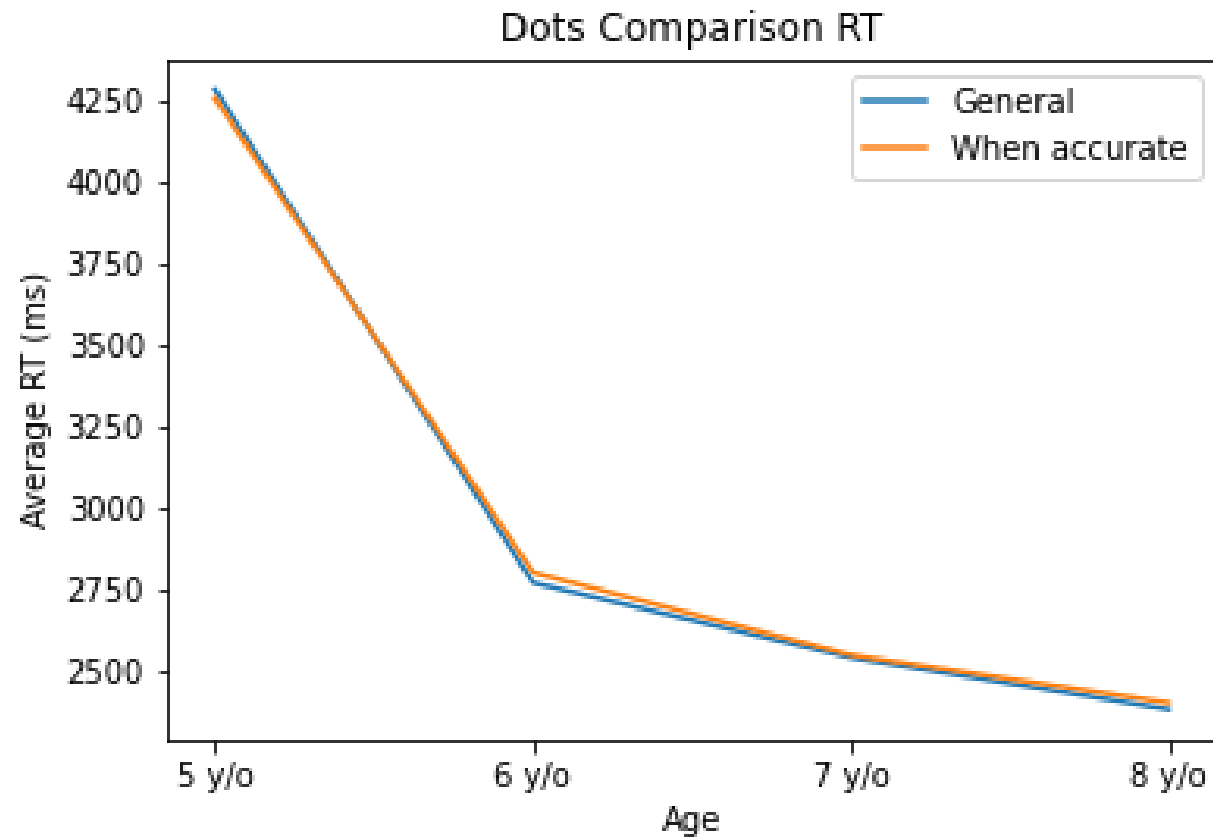
Dots Comparison

Accuracy by age

Match Sample

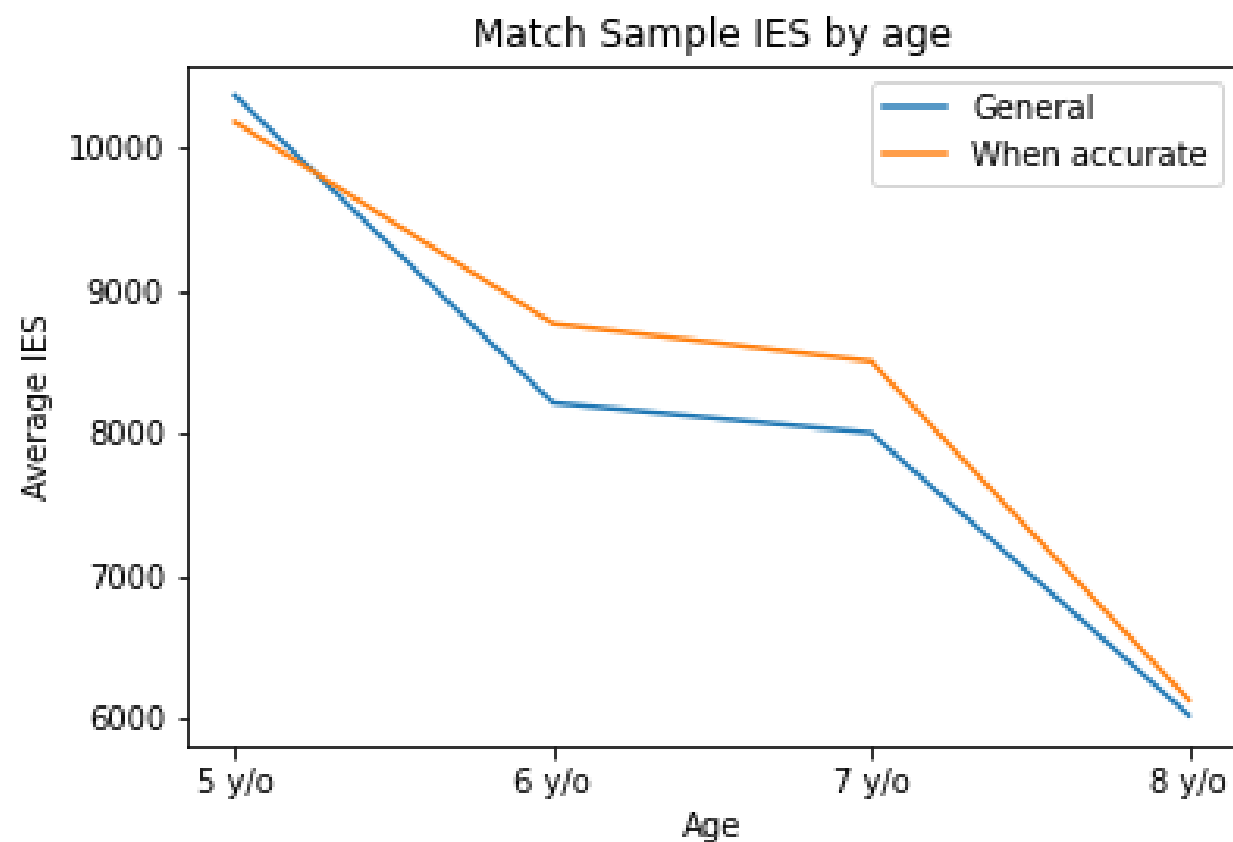|	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	7586,234	7690,458	8063,495	6804,621
LISAS when accurate	7747,306	7816,242	8106,666	6563,672
IES	10374,09	8214,887	8004,588	6021,918
IES when accurate	10186,77	8771,819	8507,47	6128,404
RCS	0,126446	0,216214	0,149472	0,183633
Accuracy	0,604167	0,688889	0,707602	0,785714
RT	5127,094	4725,635	5084,611	4473,625

Match Sample

LISAS by age
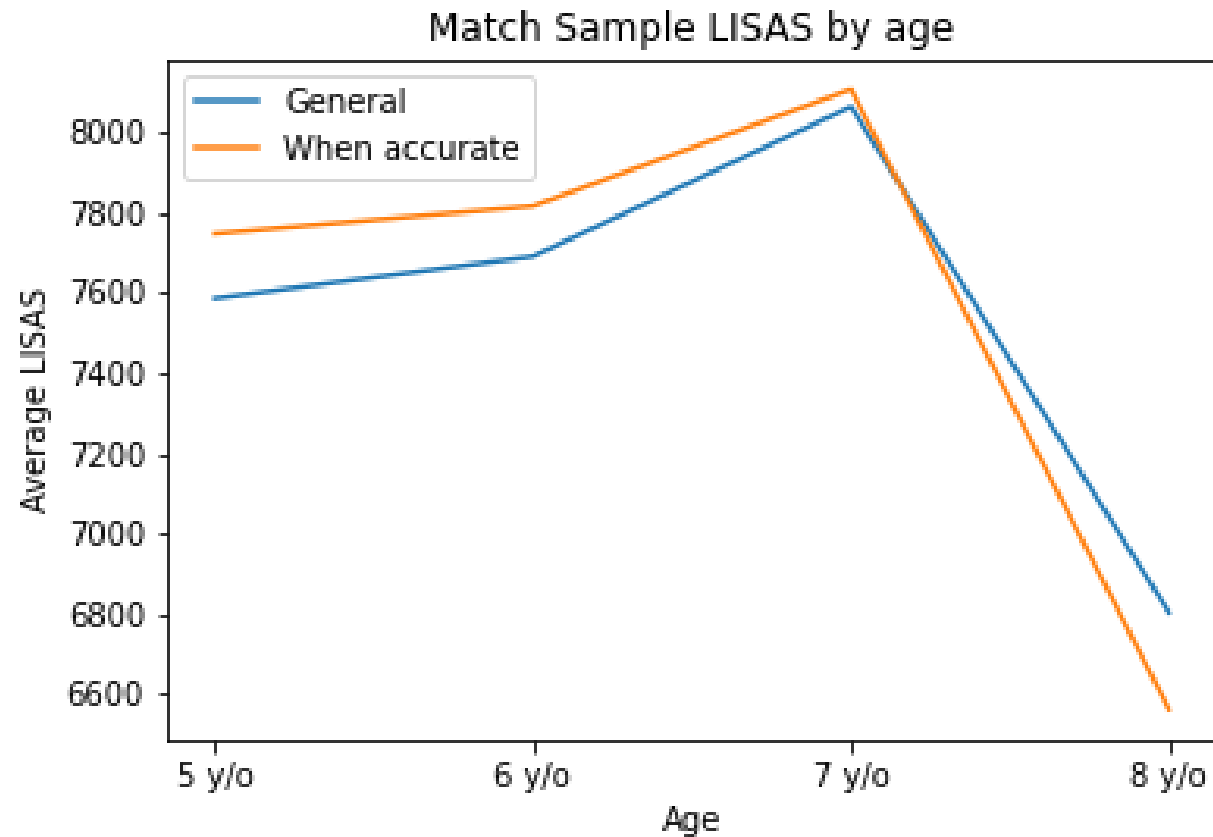
Match Sample
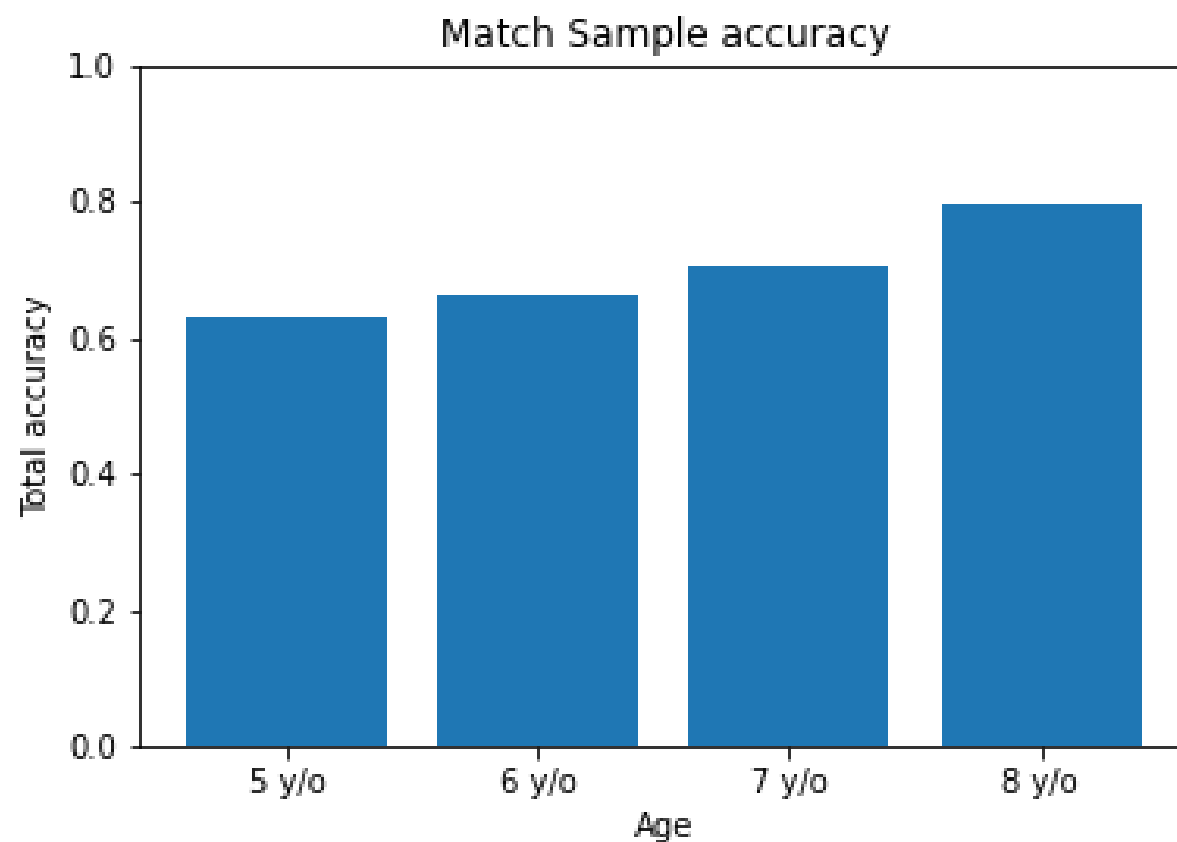
IES by age

Match Sample

RCS by age
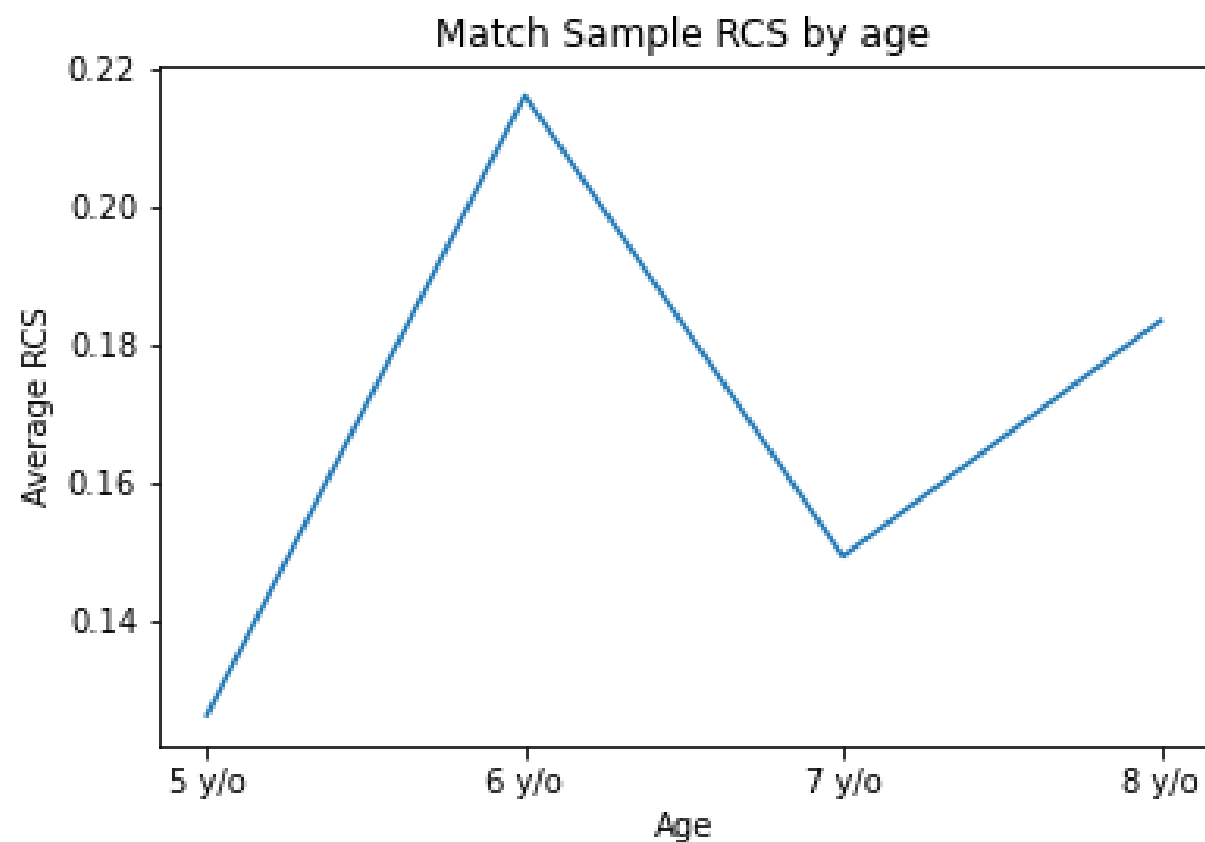
Match Sample

RT by age
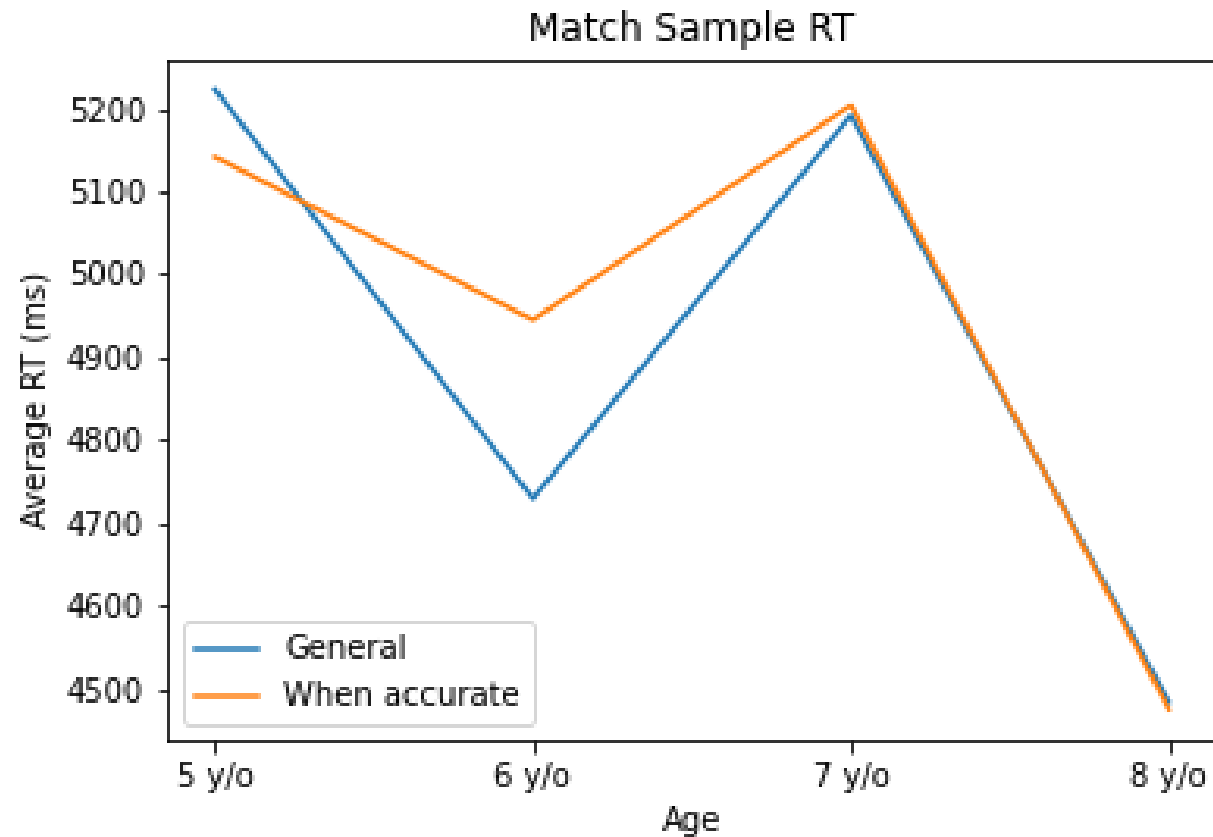
Match Sample

Accuracy by age

Match Sample Rotate

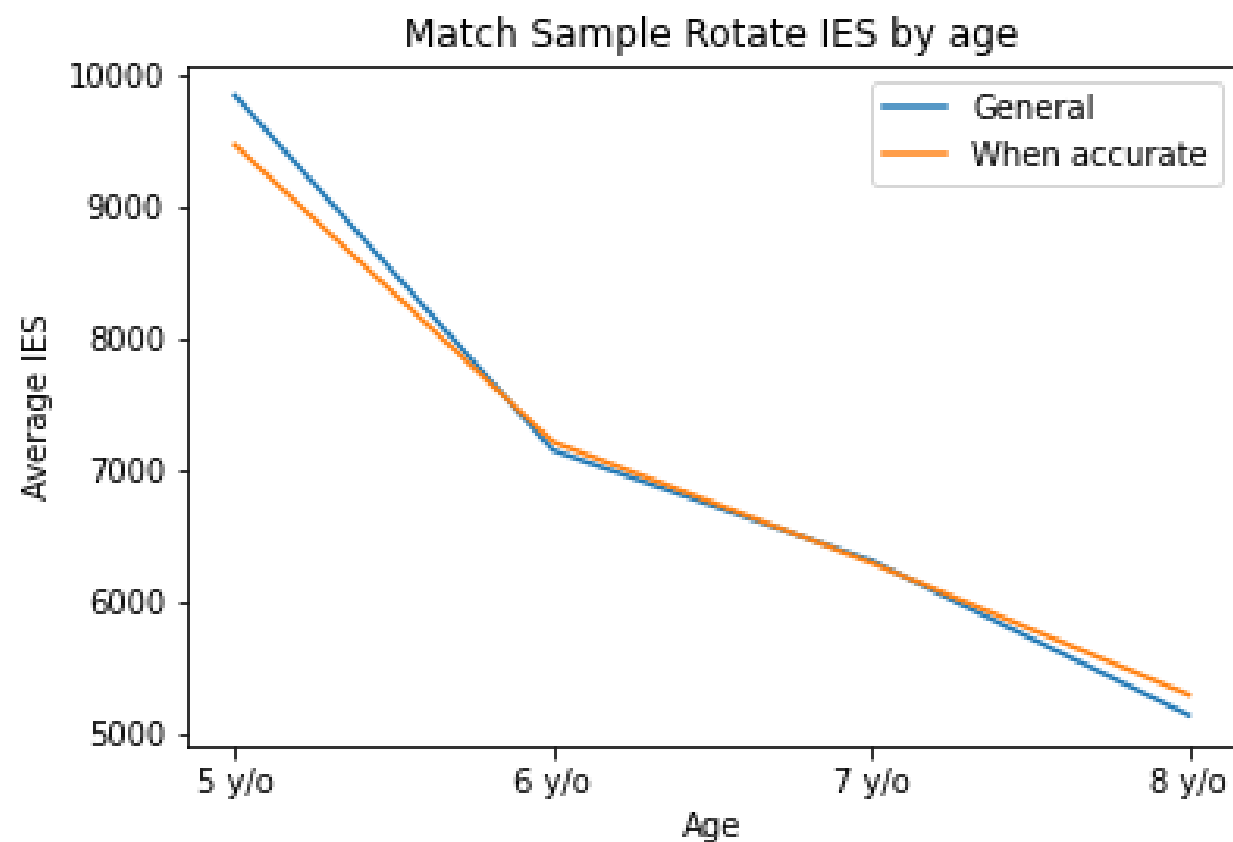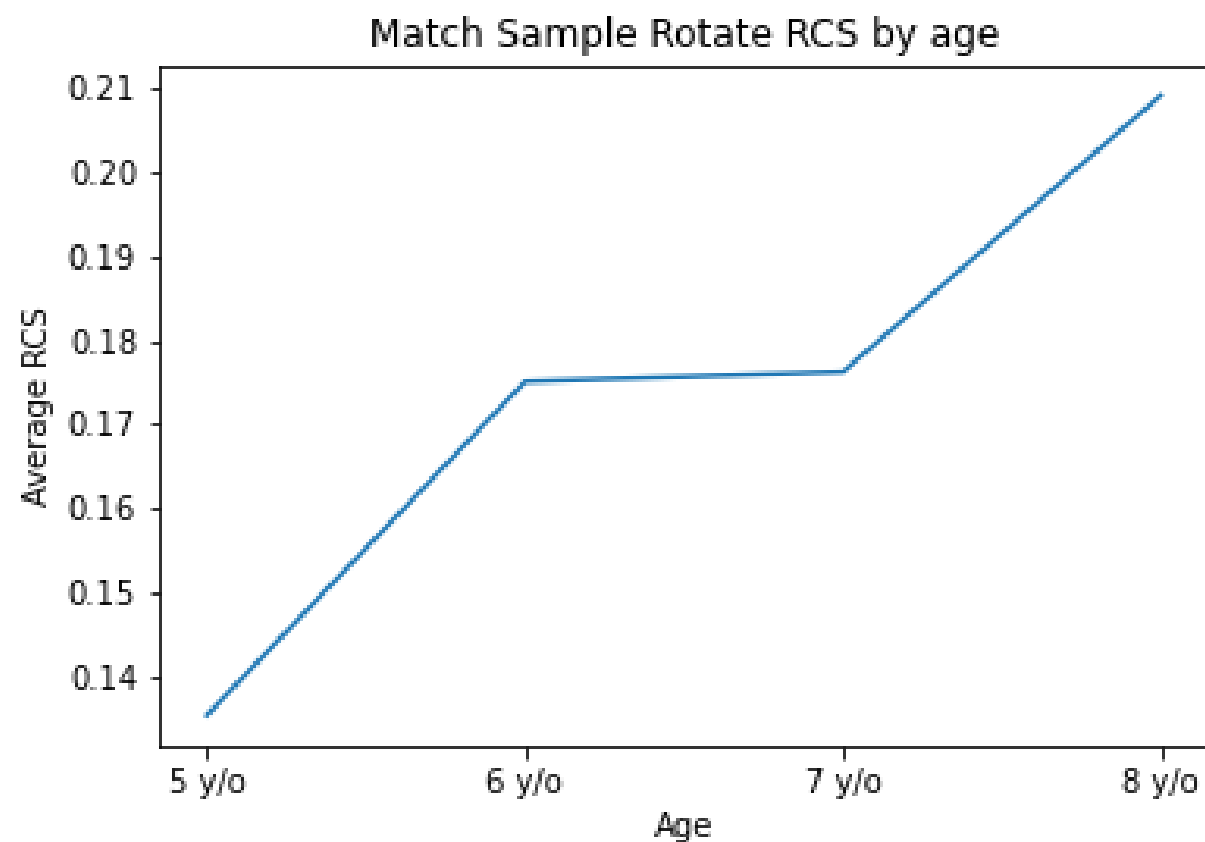|	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	6872,089	6173,73	6969,992	6032,588
LISAS when accurate	6655,54	5901,538	6967,504	6109,895
IES	9837,982	7153,268	6320,489	5149,79
IES when accurate	9463,403	7217,091	6302,945	5304,087
RCS	0,135383	0,175117	0,176269	0,209213
Accuracy	0,597222	0,722222	0,766082	0,873016
RT	4998,65	4502,905	4574,737	4341,257

Match Sample Rotate

LISAS by age
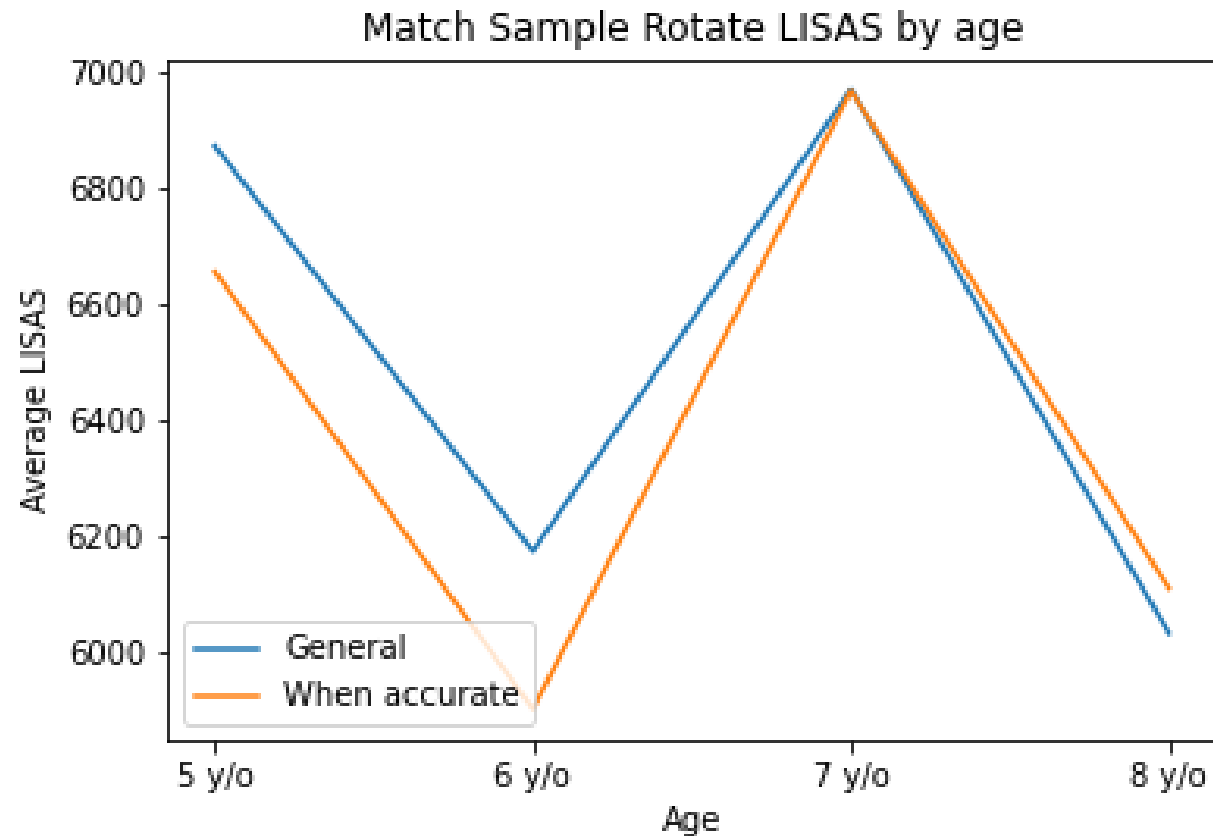
Match Sample Rotate

IES by age

Match Sample Rotate

RCS by age

Match Sample Rotate

RT by age
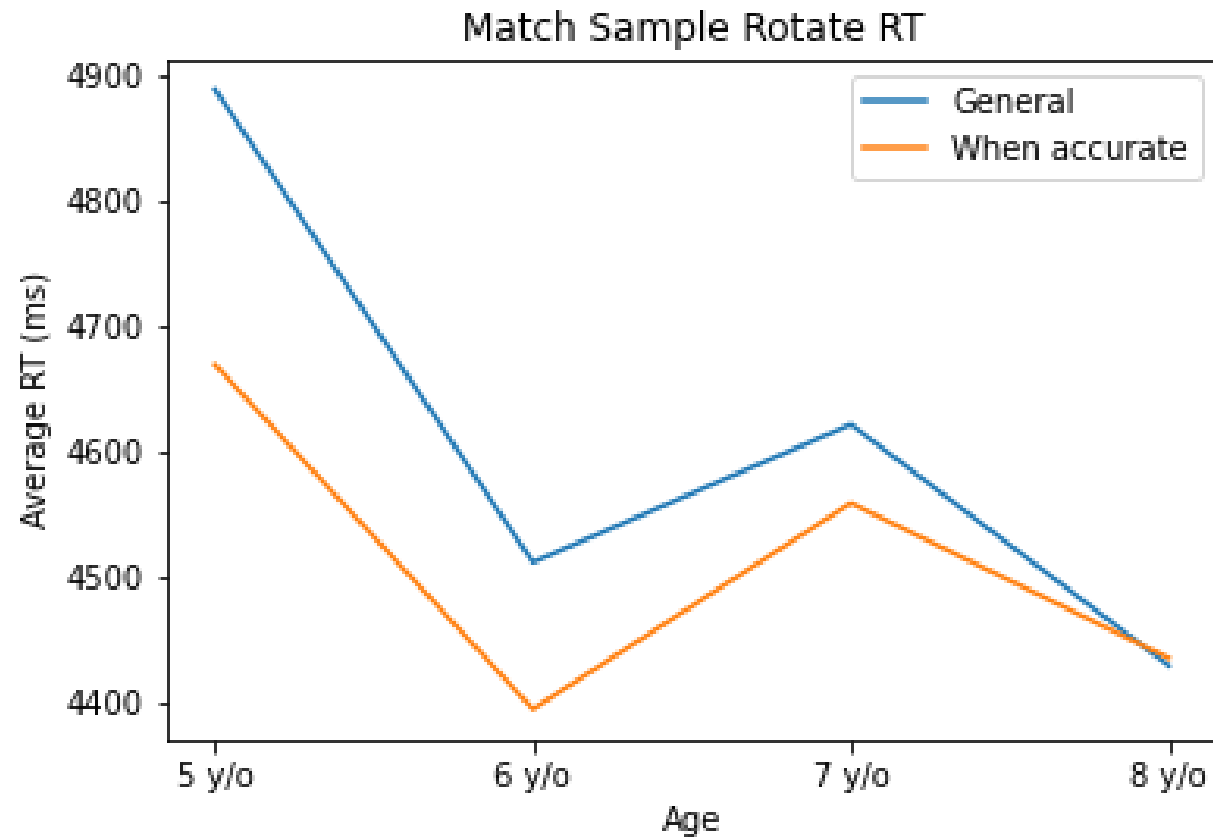
# **Match Sample Rotate**

Accuracy by age
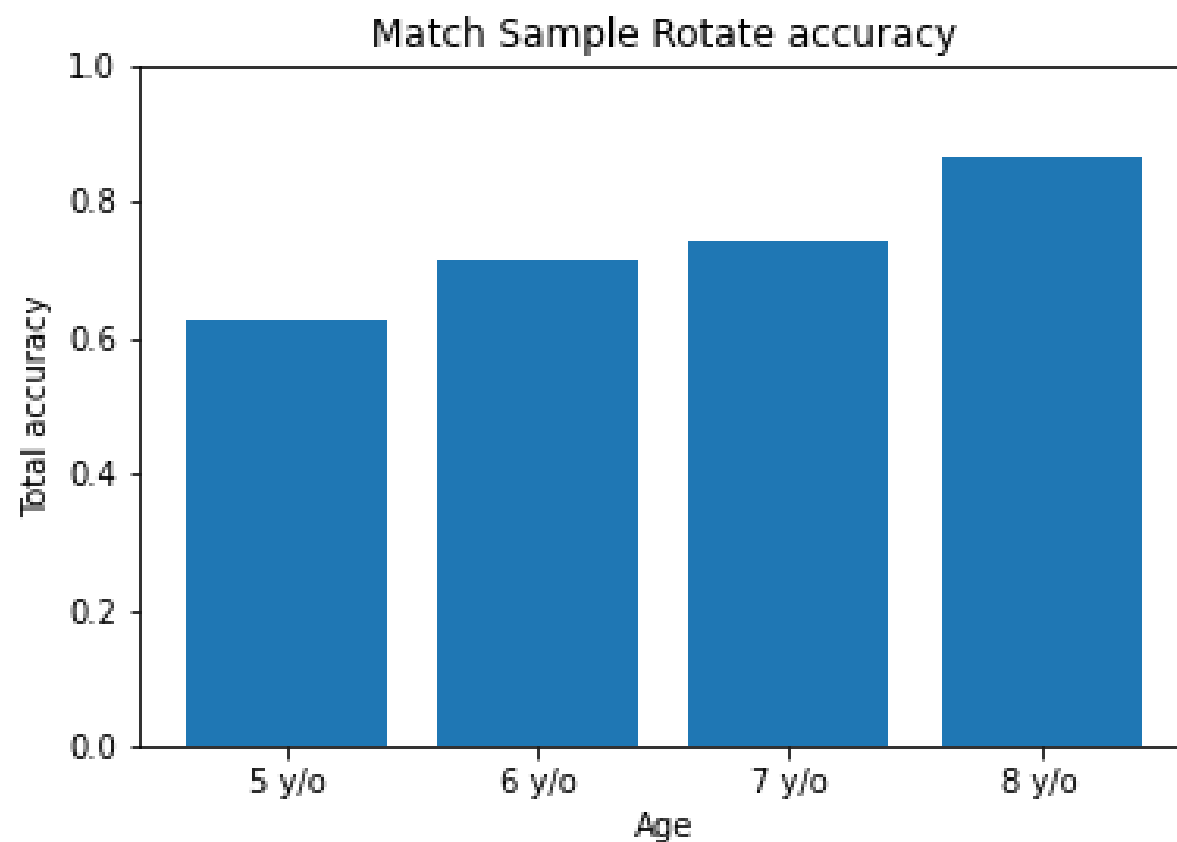
Match Points Number

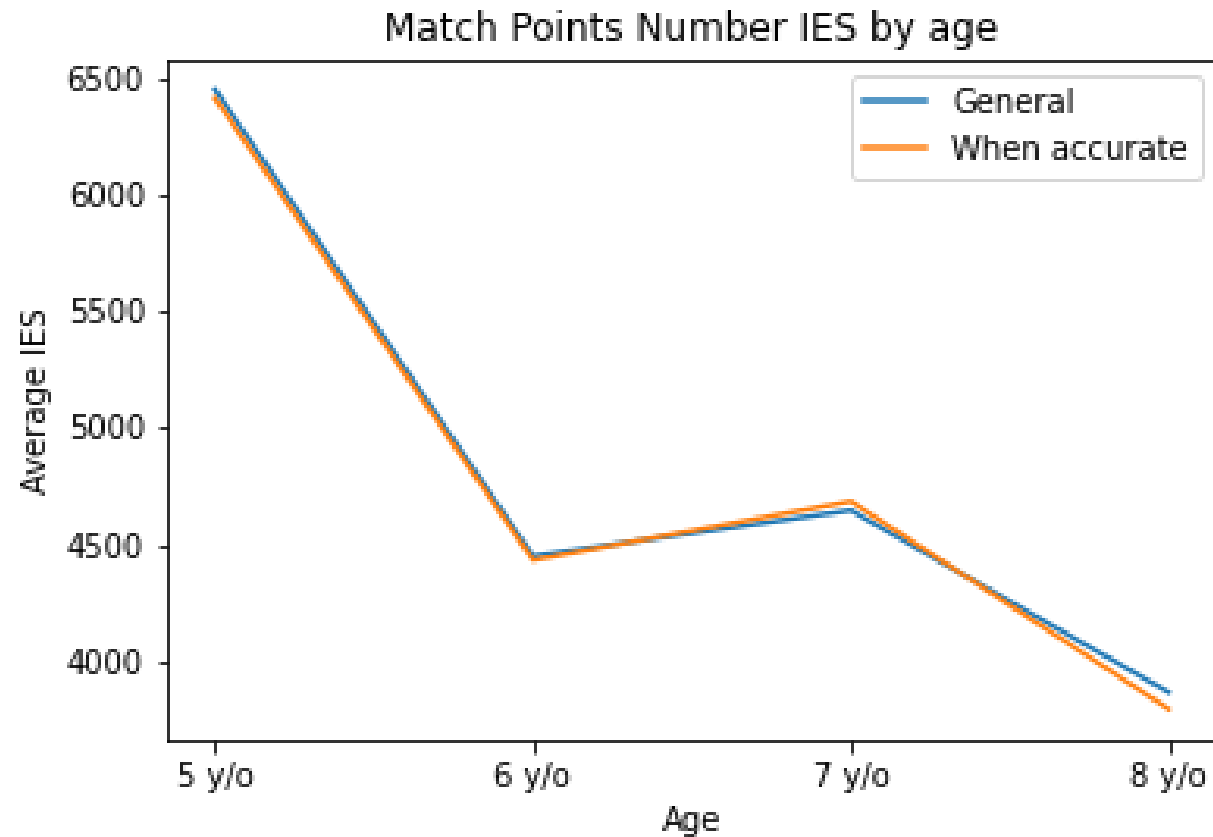|	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	9697,497	5661,006	5274,758	4916,137
LISAS when accurate	9481,906	5624,878	5324,527	4822,645
IES	6450,687	4451,822	4647,384	3867,898
IES when accurate	6413,652	4434,161	4686,12	3796,119
RCS	0,167743	0,273929	0,23943	0,284934
Accuracy	0,926667	0,915	0,936842	0,946429
RT	5881,213	4067,363	4412,726	3596,179

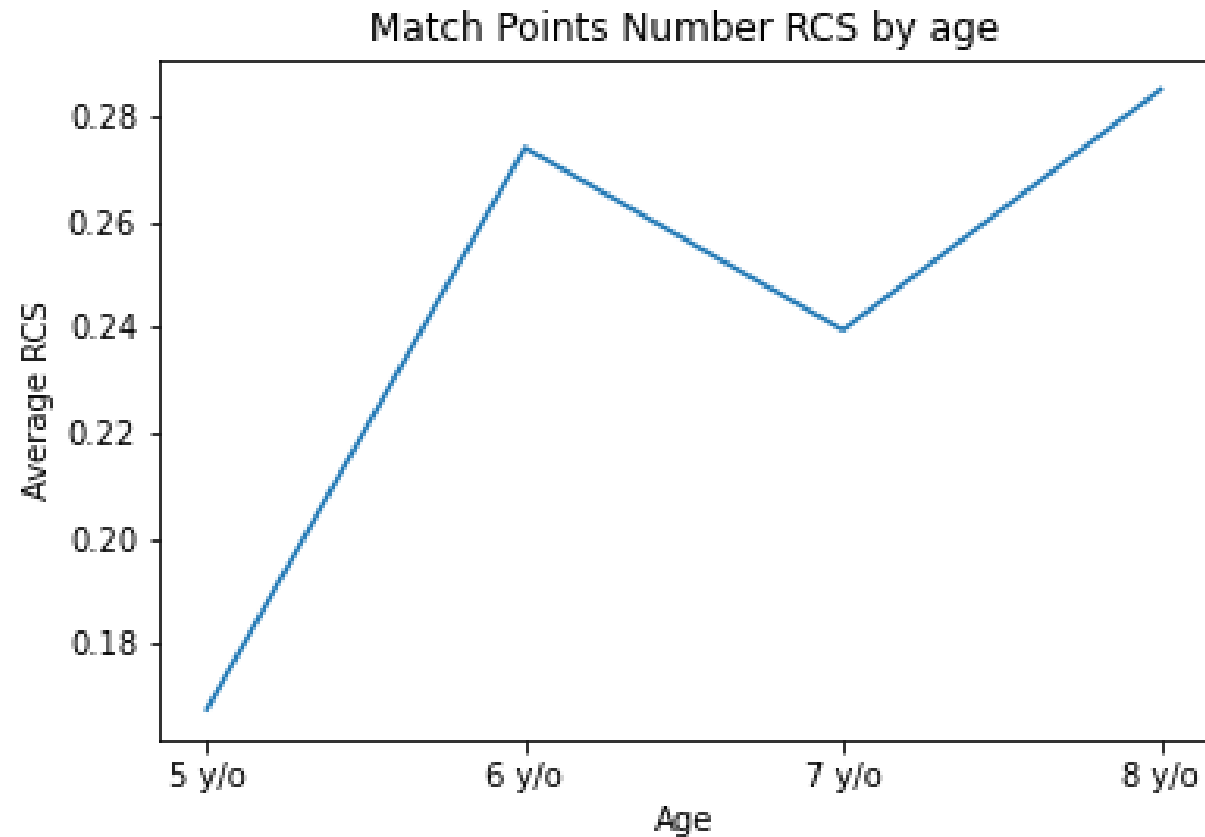# Match Points Number

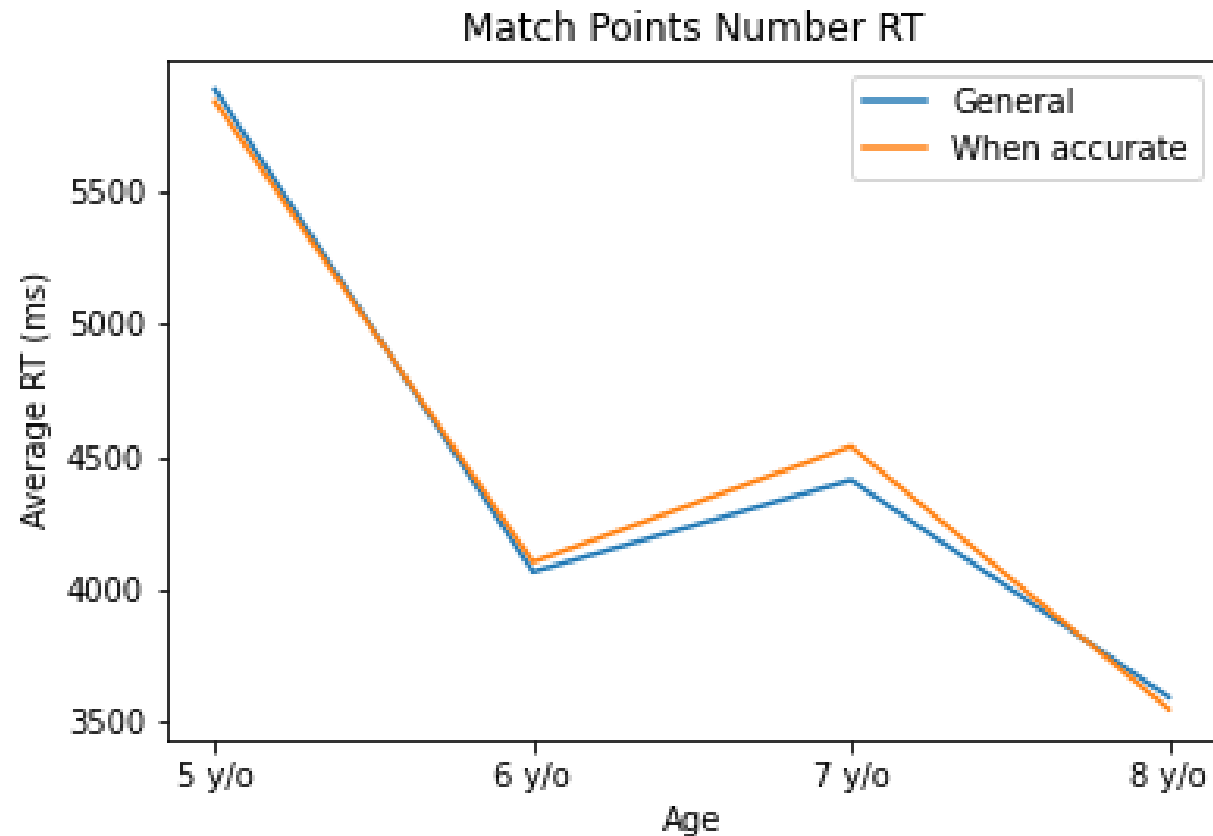## LISAS by age
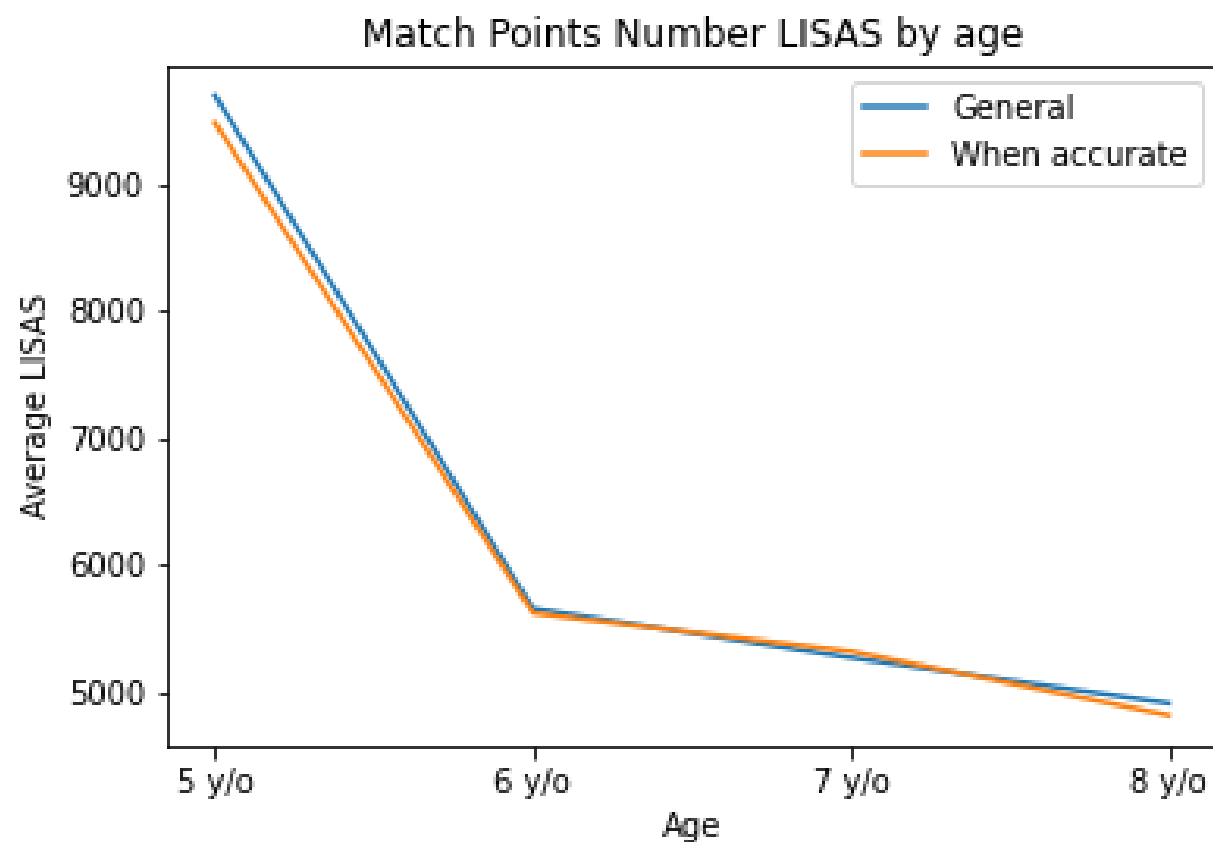
Match Points Number

IES by age

Match Points Number

RCS by age

Match Points Number

RT by age

Match Points Number

Accuracy by age
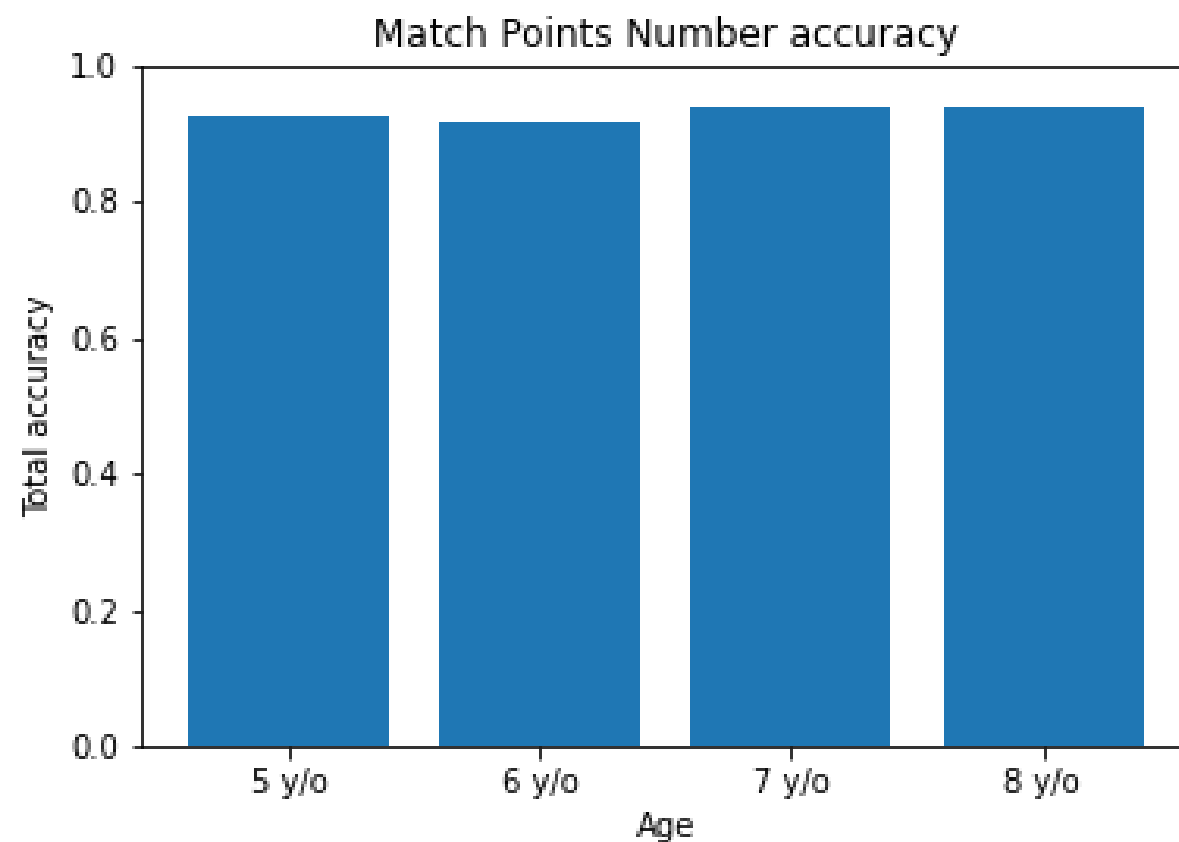
Symbolic Magnitude

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	4820,769	2195,25	1826,887	1468,055
LISAS when accurate	4819,507	2185,004	1844,865	1467,879
IES	4268,909	1864,305	1546,552	1425,349
IES when accurate	4195,366	1905,878	1555,43	1427,968
RCS	0,357566	0,636999	0,670557	0,731119
Accuracy	0,875	0,96	0,973684	0,992857
RT	3037,556	1718,305	1496,633	1415,337

Symbolic Magnitude

LISAS by age
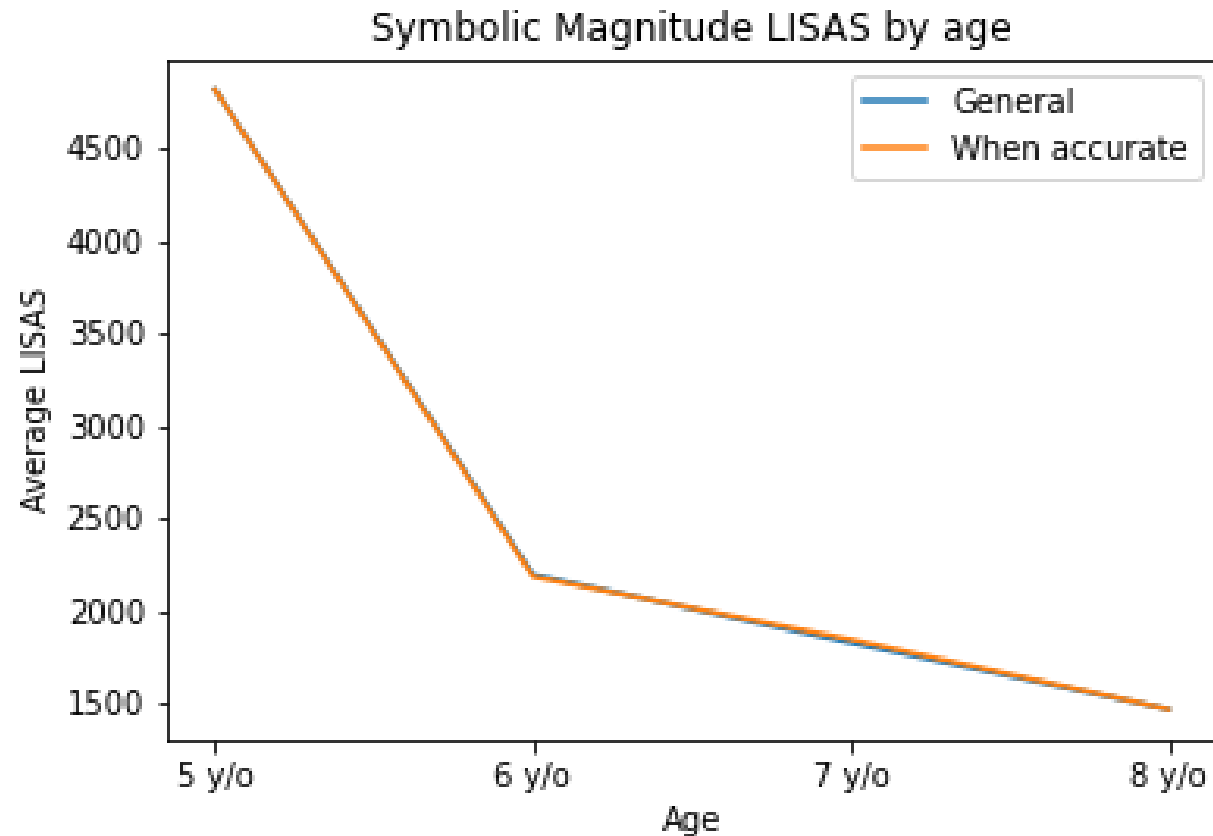
Symbolic Magnitude

IES by age

Symbolic Magnitude

RCS by age
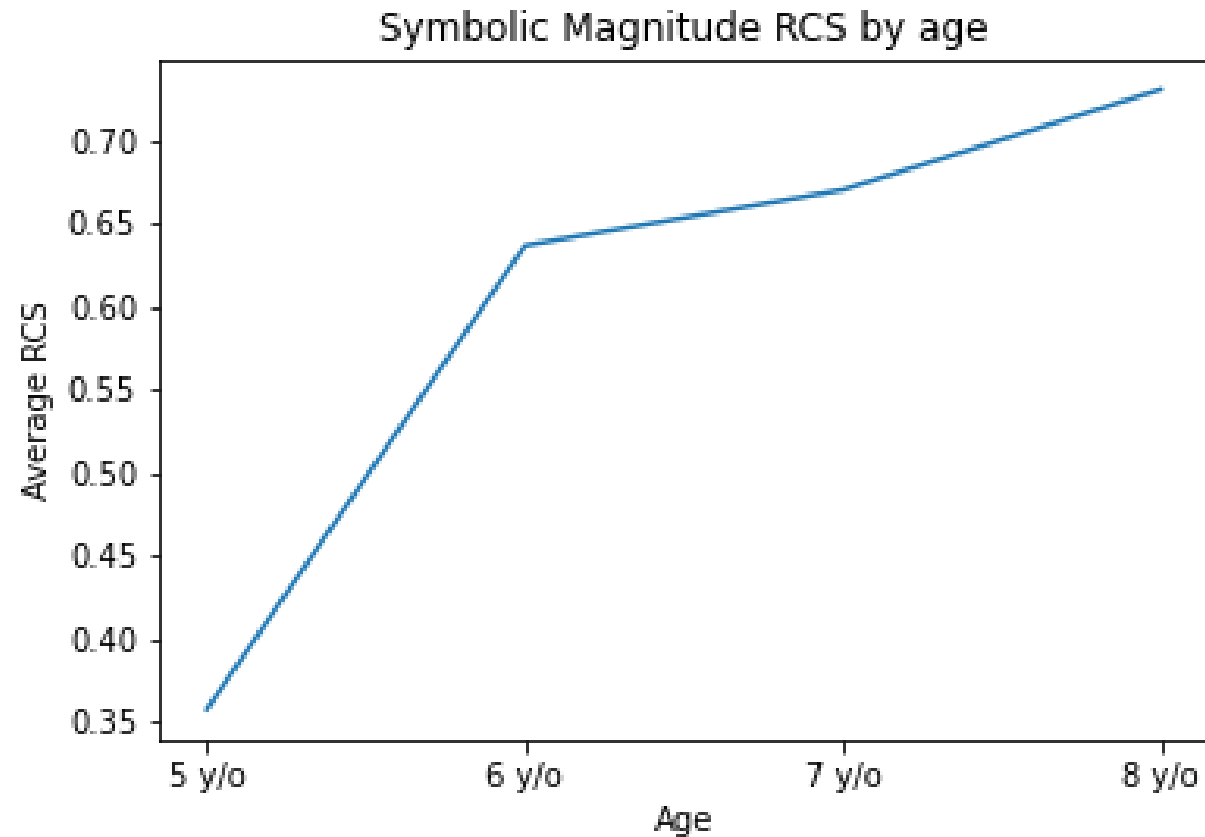
Symbolic Magnitude

RT by age
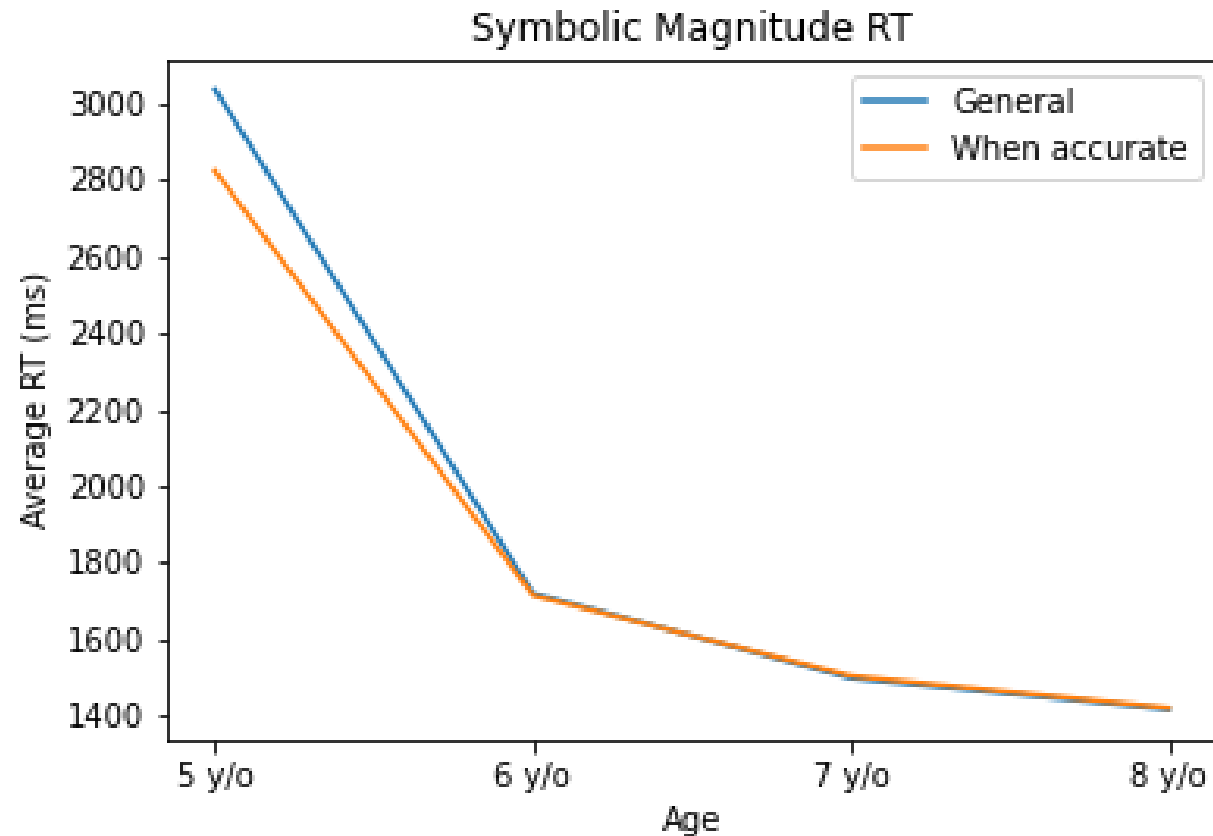
Symbolic Magnitude
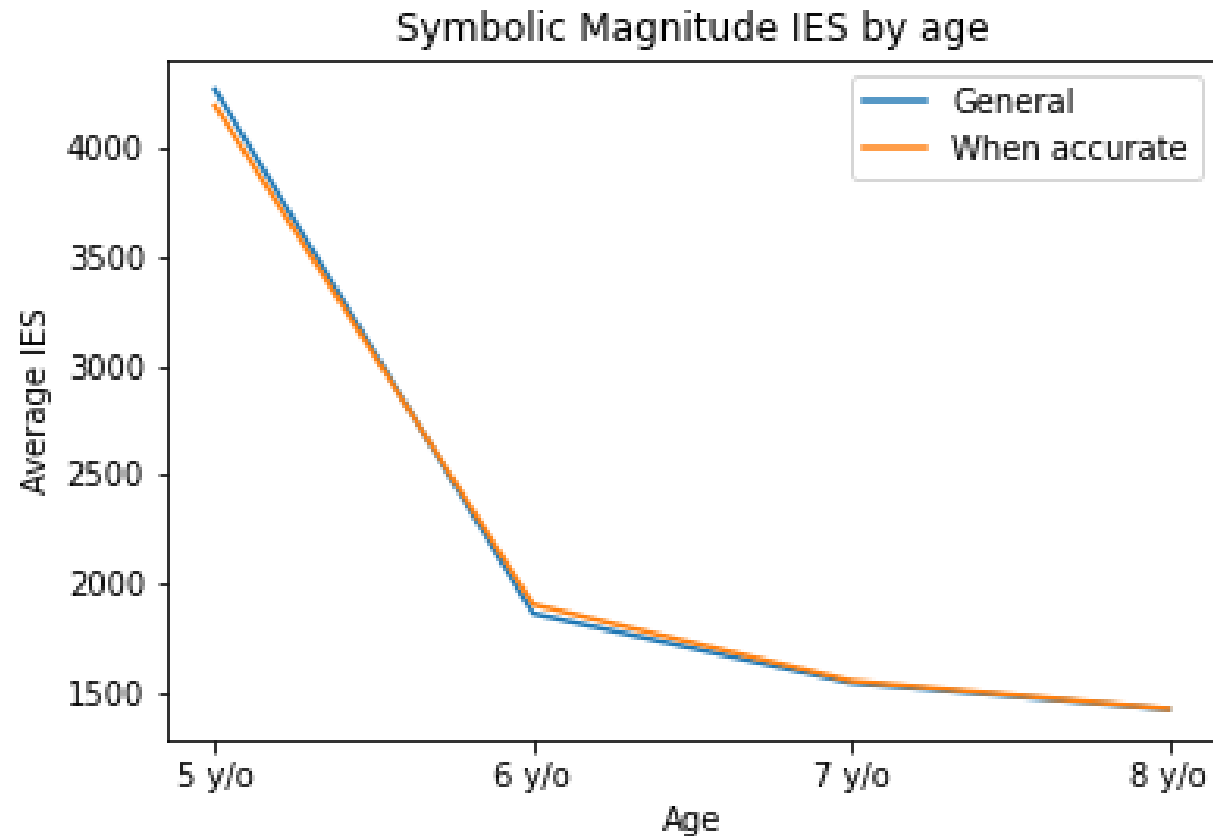
Accuracy by age
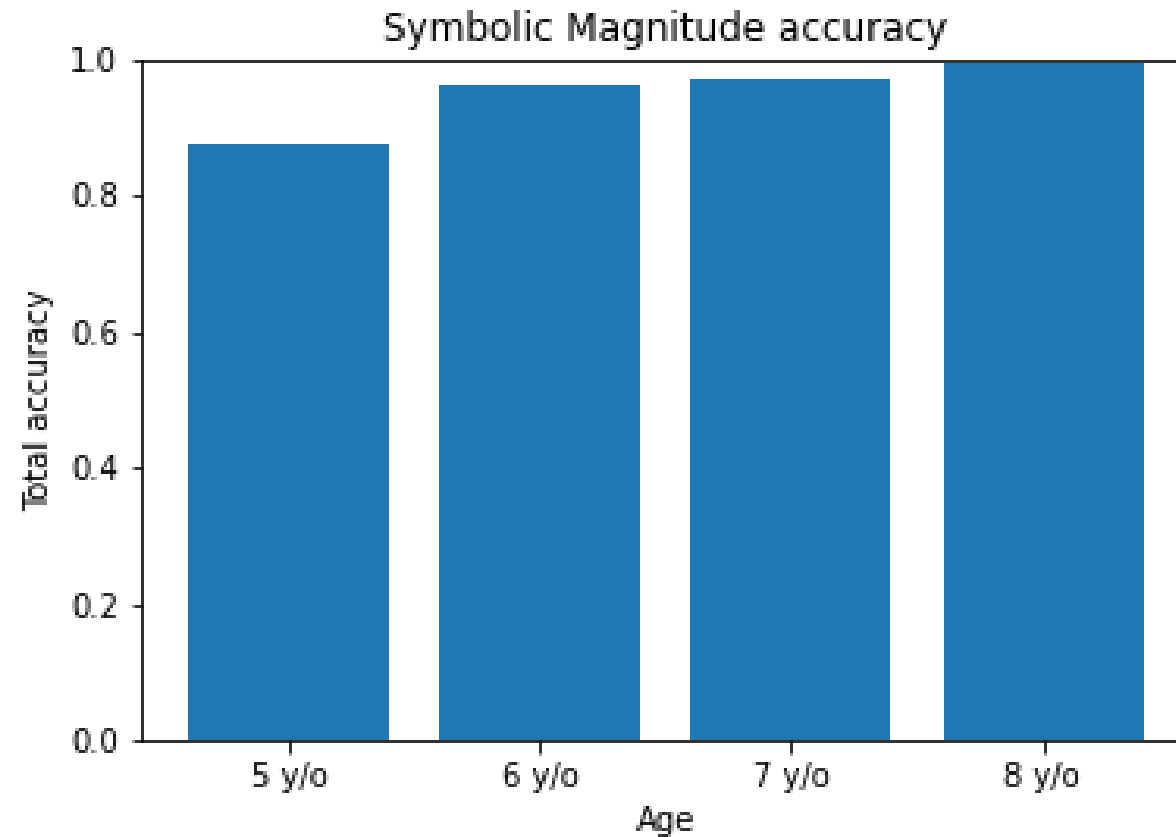
Numeric Line

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	10160,83	8727,331	9480,715	7714,335
LISAS when accurate	9317,224	7770,217	8139,912	7264,673
IES	19535,35	13522,12	16119,19	10016,51
IES when accurate	17962,52	12134,64	13612,76	8702,66
RCS	0,084383	0,14759	0,118822	0,166396
Accuracy	0,5	0,5775	0,615789	0,771429
RT	7105,625	5556,199	6017,024	5242,377

Numeric Line

LISAS by age
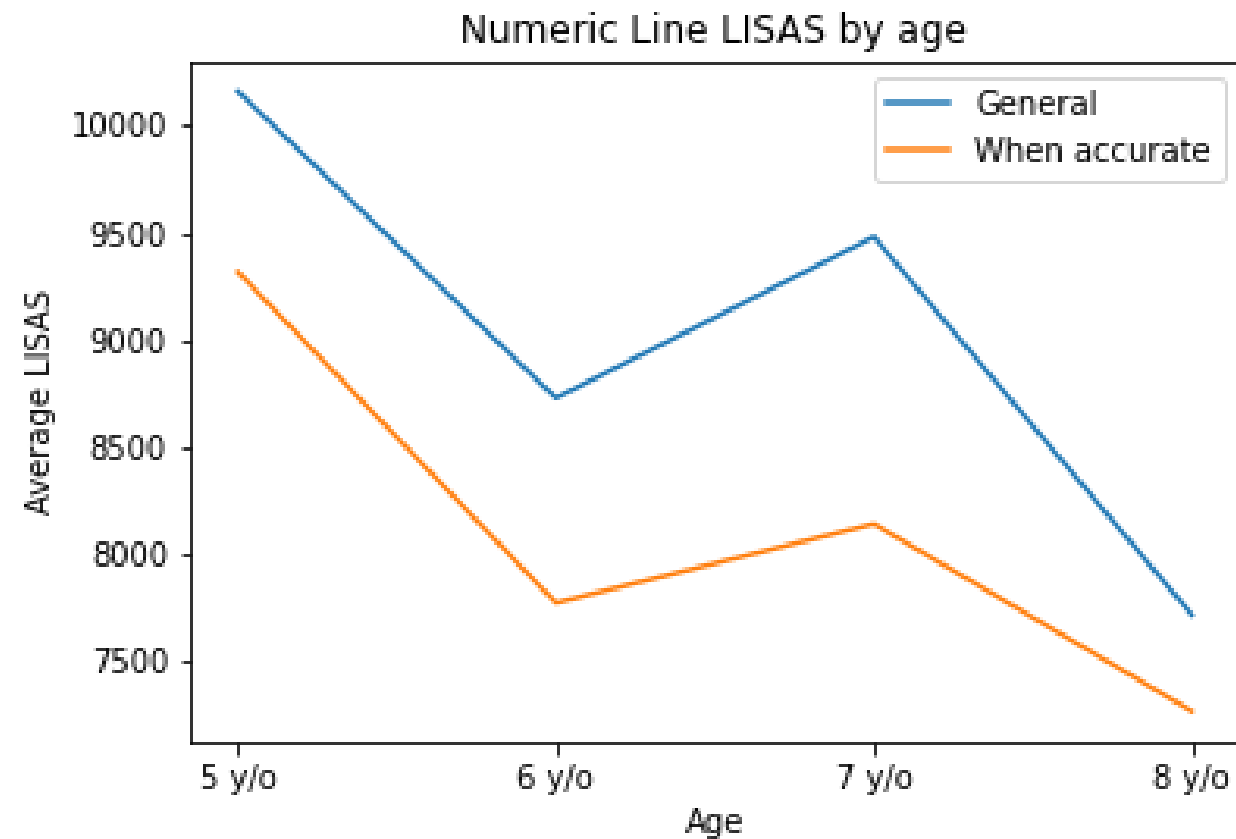
Numeric Line

IES by age
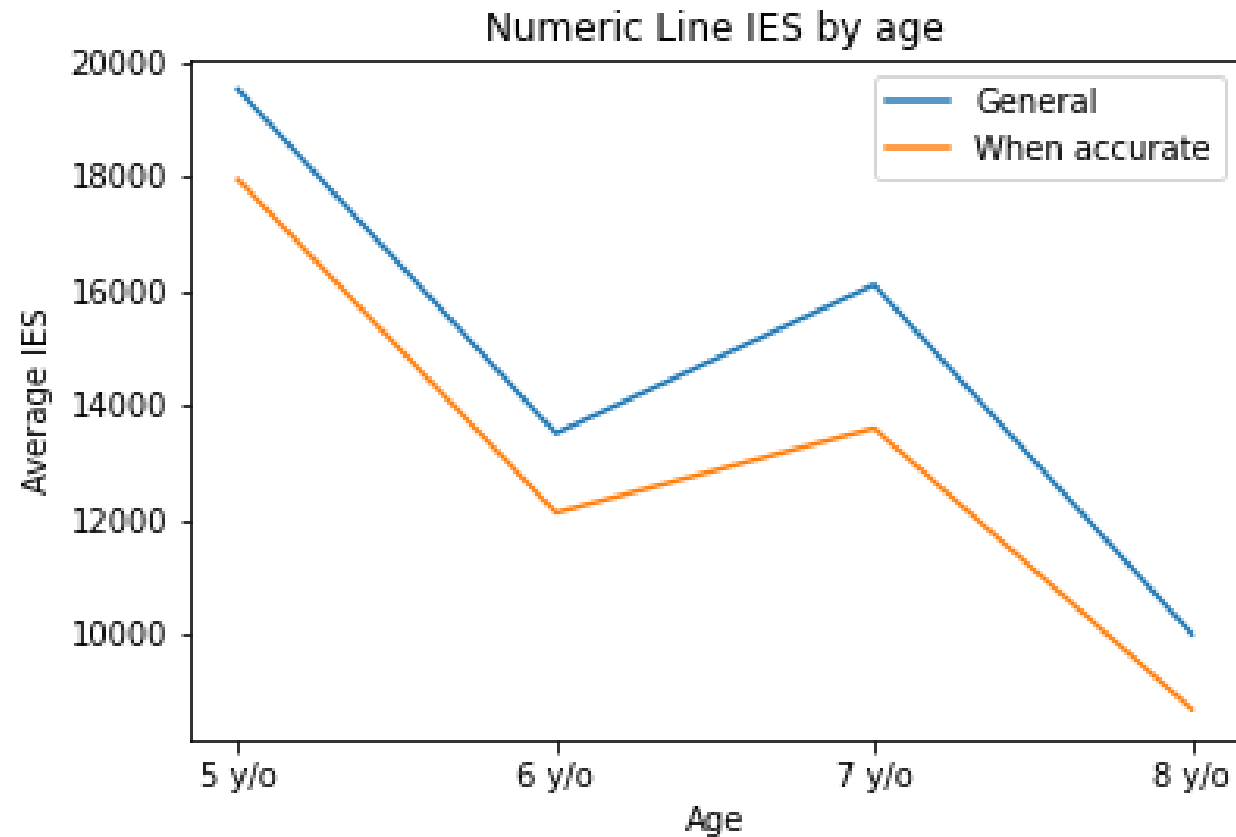
Numeric Line

RCS by age
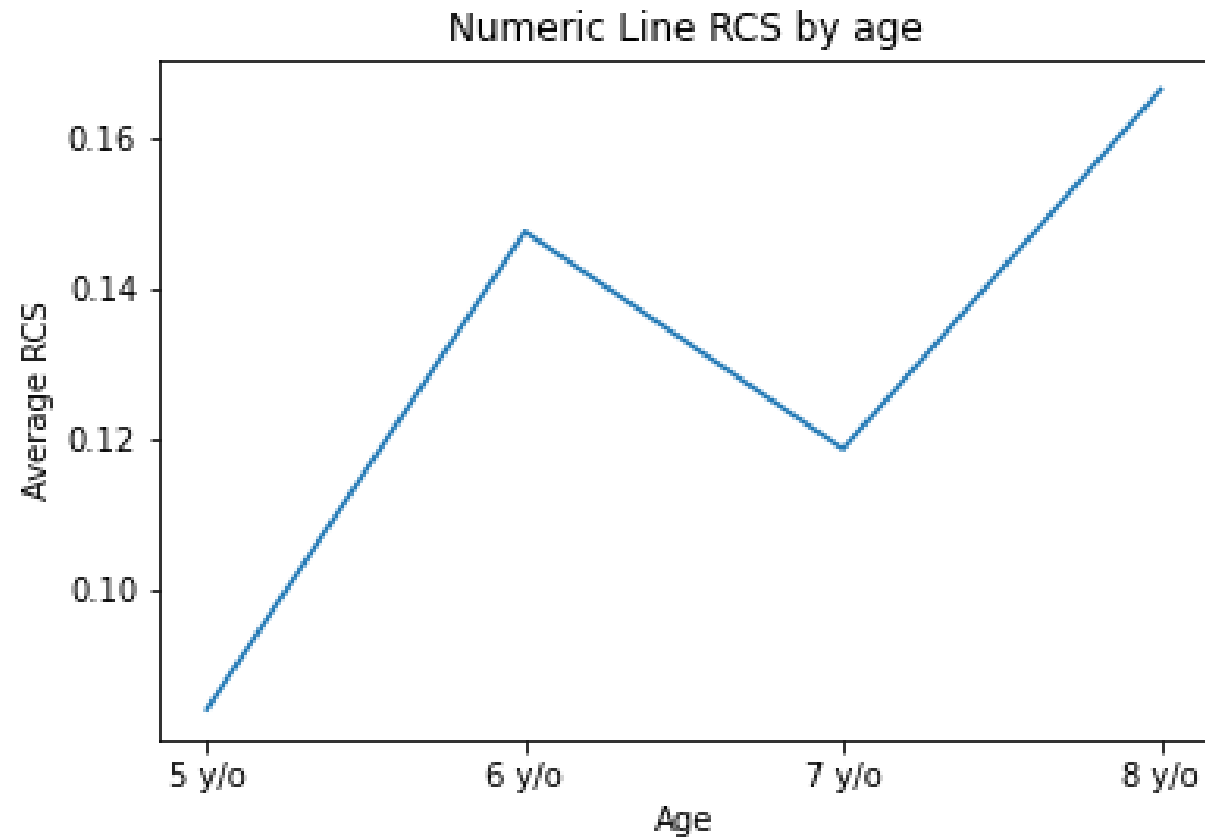
Numeric Line

RT by age
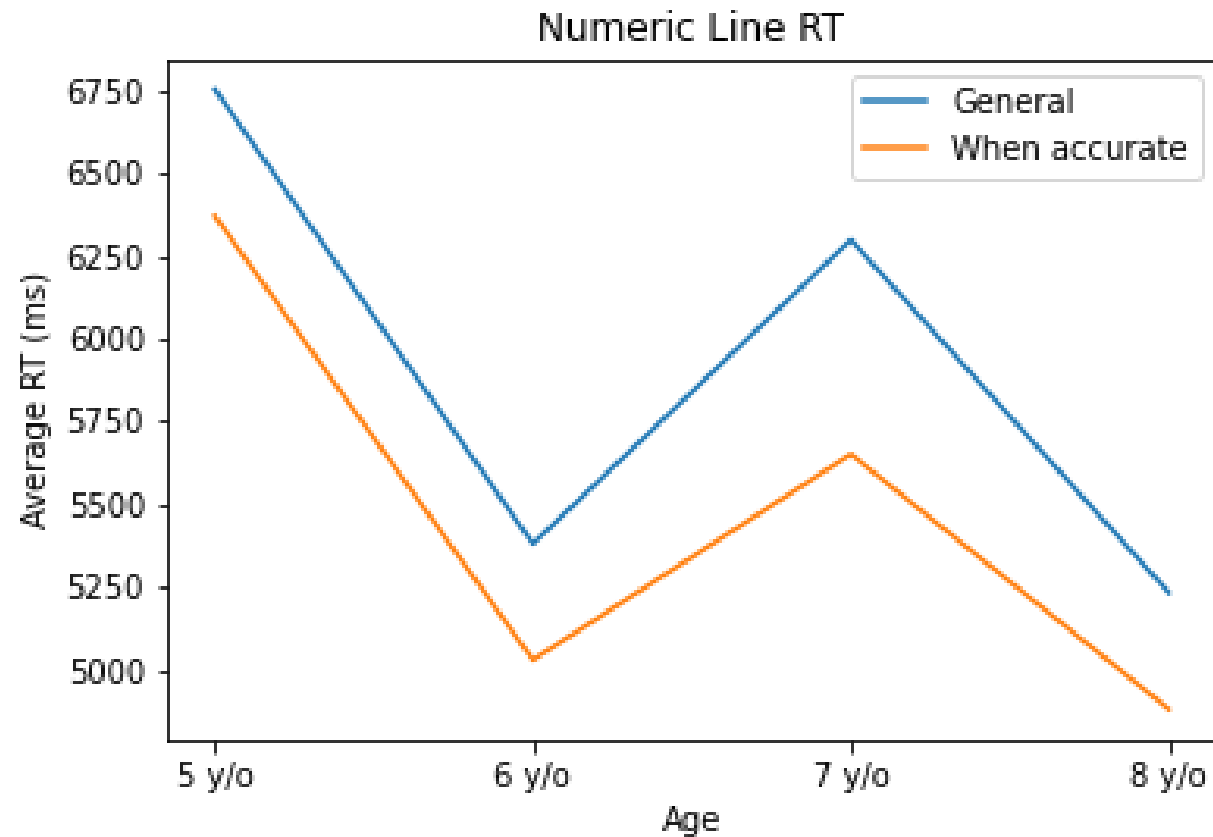
Numeric Line

Accuracy by age
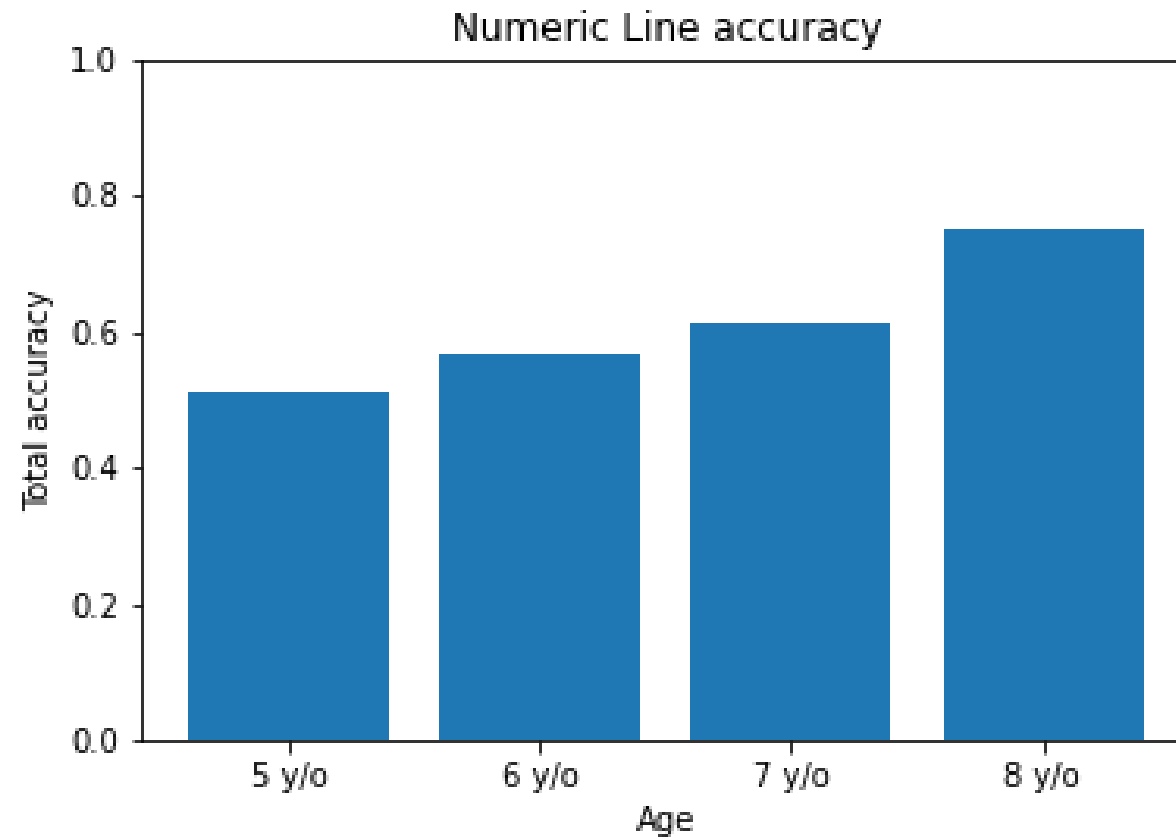
Counting Forward

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	9964,497	6133,554	4281,354	5942,072
LISAS when accurate	9602,667	6193,104	4223,083	5204,104
IES	9868,247	4856,562	3881,138	4135,734
IES when accurate	9934,138	5037,249	3923,501	4005,805
RCS	0,137308	0,290848	0,279963	0,261008
Accuracy	0,902778	0,925	0,976608	0,869048
RT	7736,625	4295,806	3775,83	3488,631

Counting Forward

LISAS by age
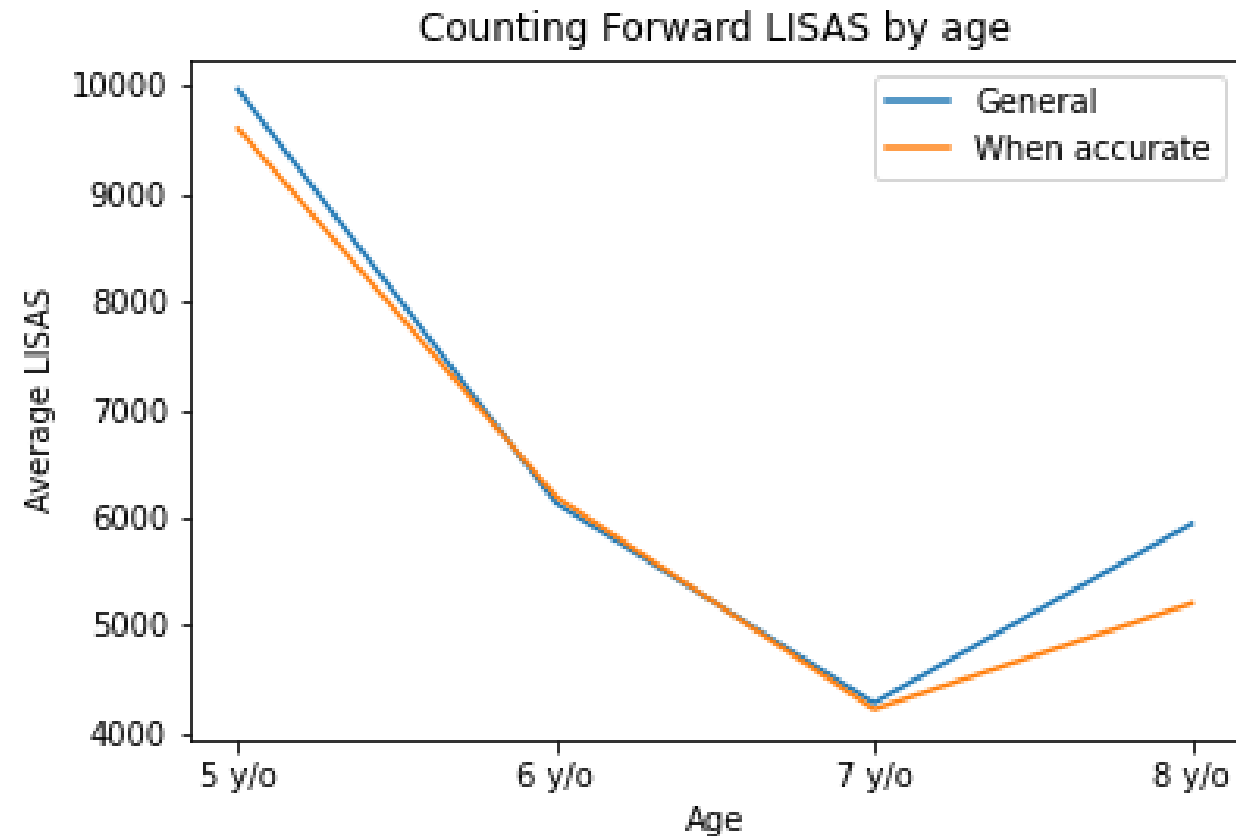
Counting Forward

IES by age
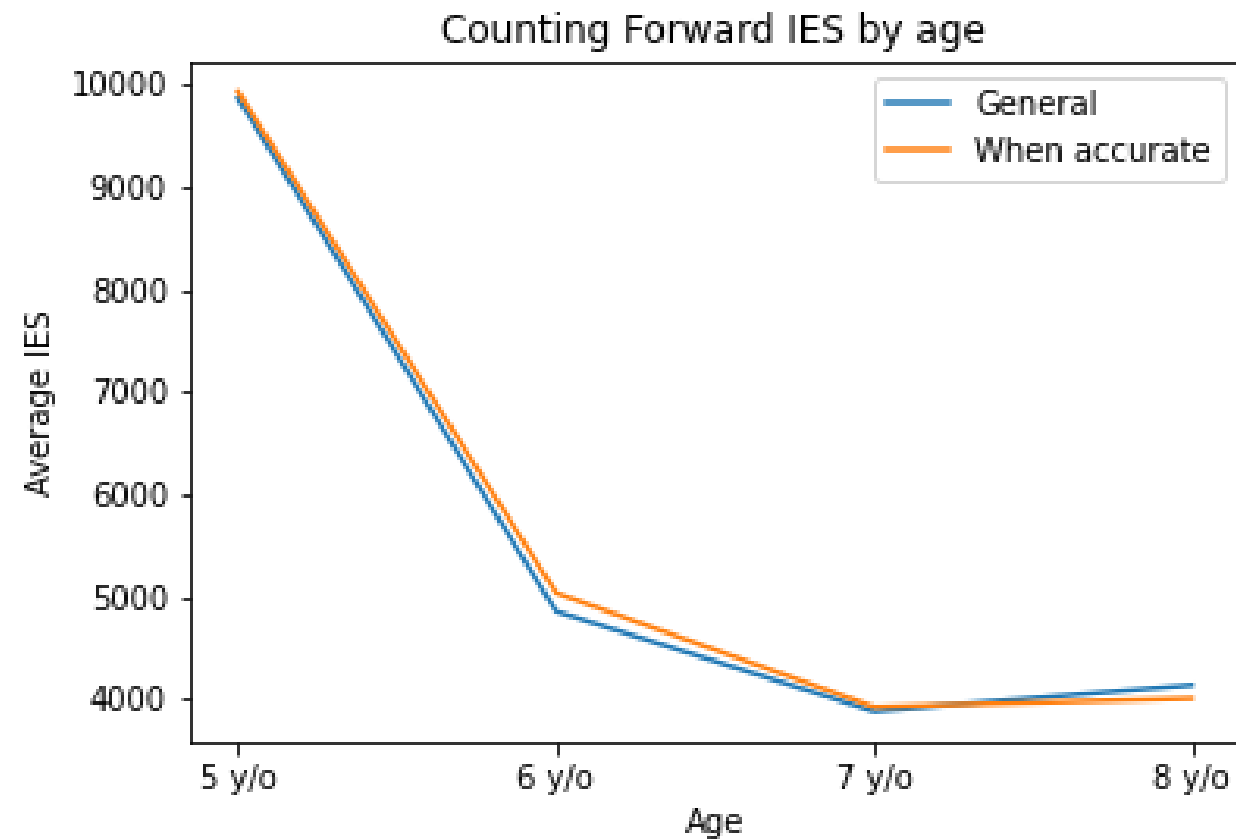
Counting Forward

RCS by age
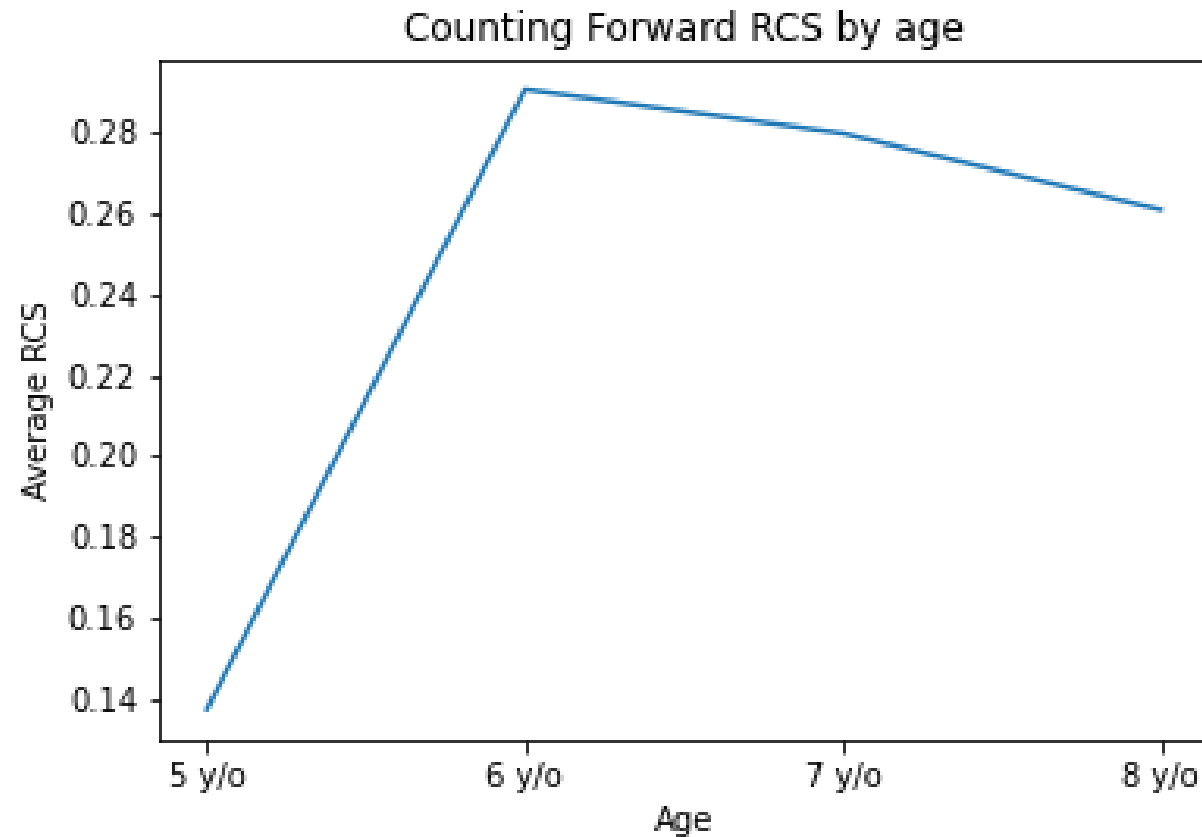
Counting Forward

RT by age
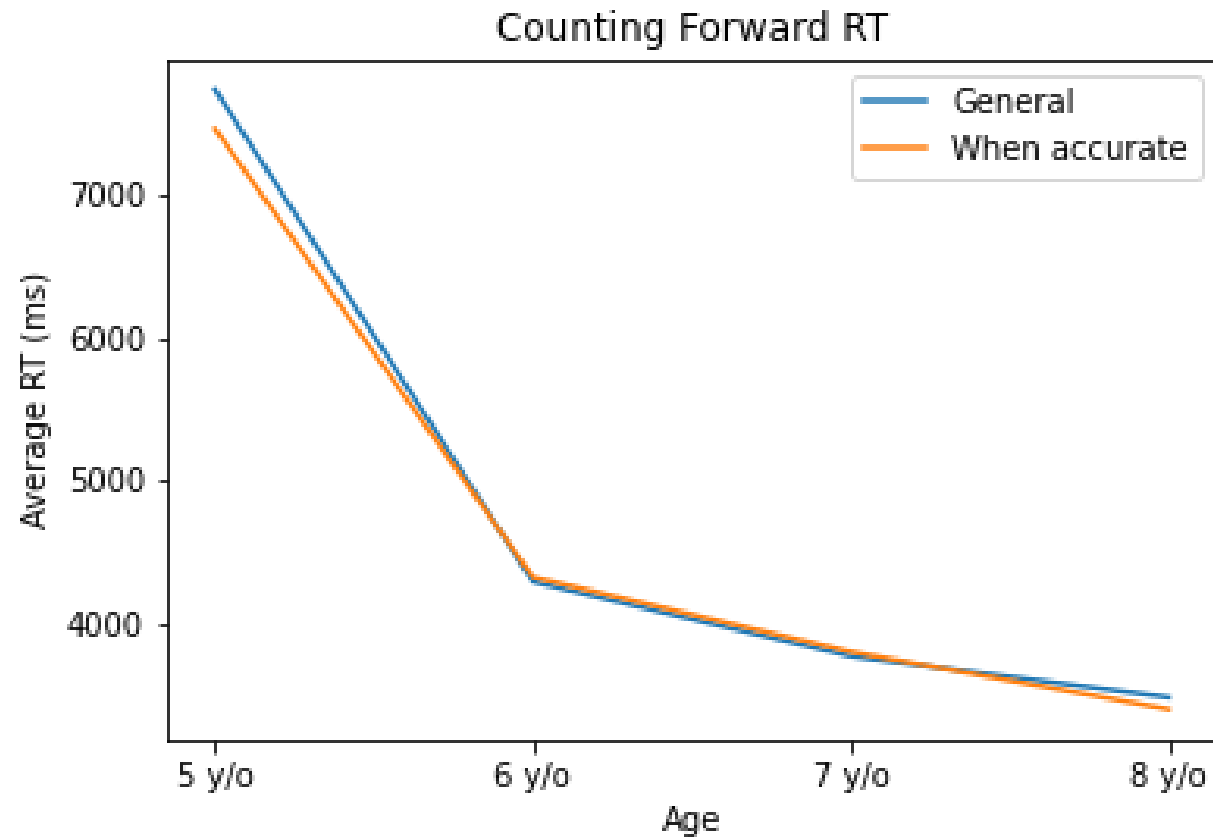
Counting Forward

Accuracy by age
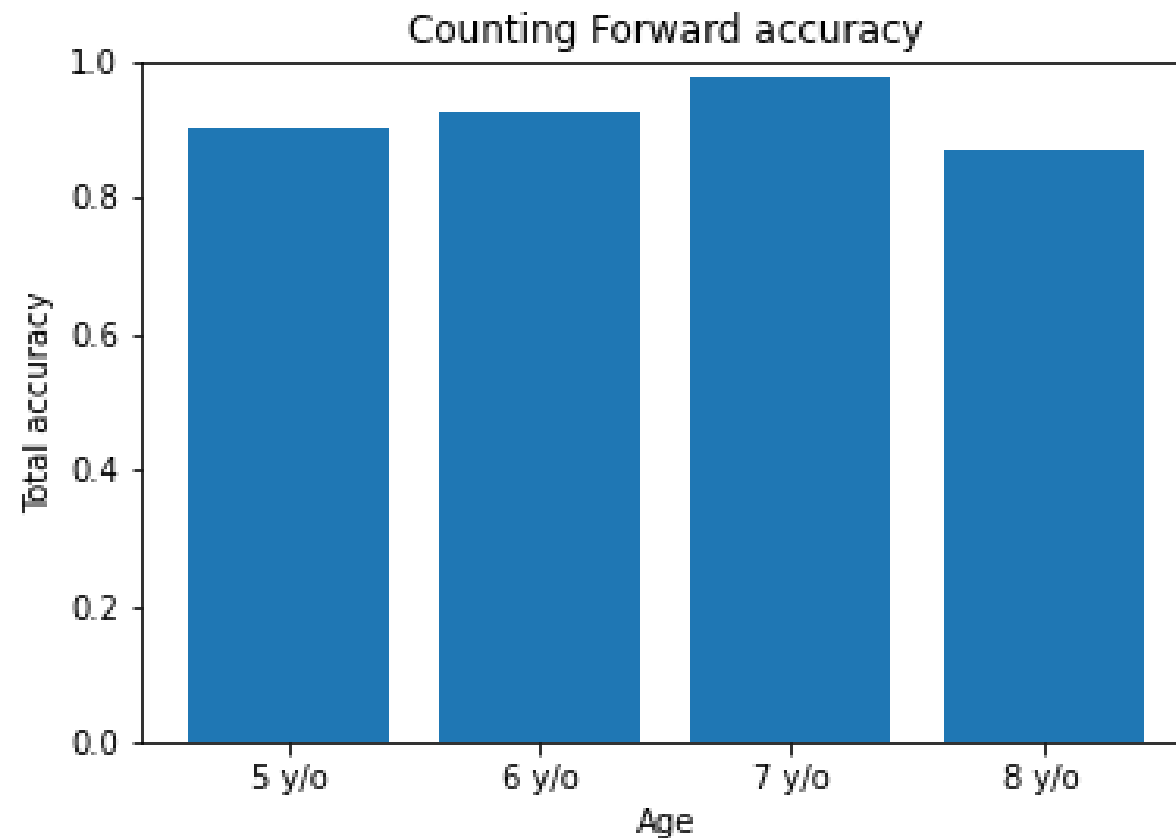
Counting Backward

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	18276,02	10028,93	8858,177	7424,184
LISAS when accurate	16992,45	9381,126	8365,183	7118,078
IES	14414,46	6382,03	4743,843	3977,368
IES when accurate	13702,42	6280,892	4767,538	4118,096
RCS	0,098012	0,261045	0,233978	0,267812
Accuracy	0,773026	0,897368	0,958449	0,917293
RT	9576,918	5101,347	4535,13	3535,515

Counting Backward

LISAS by age
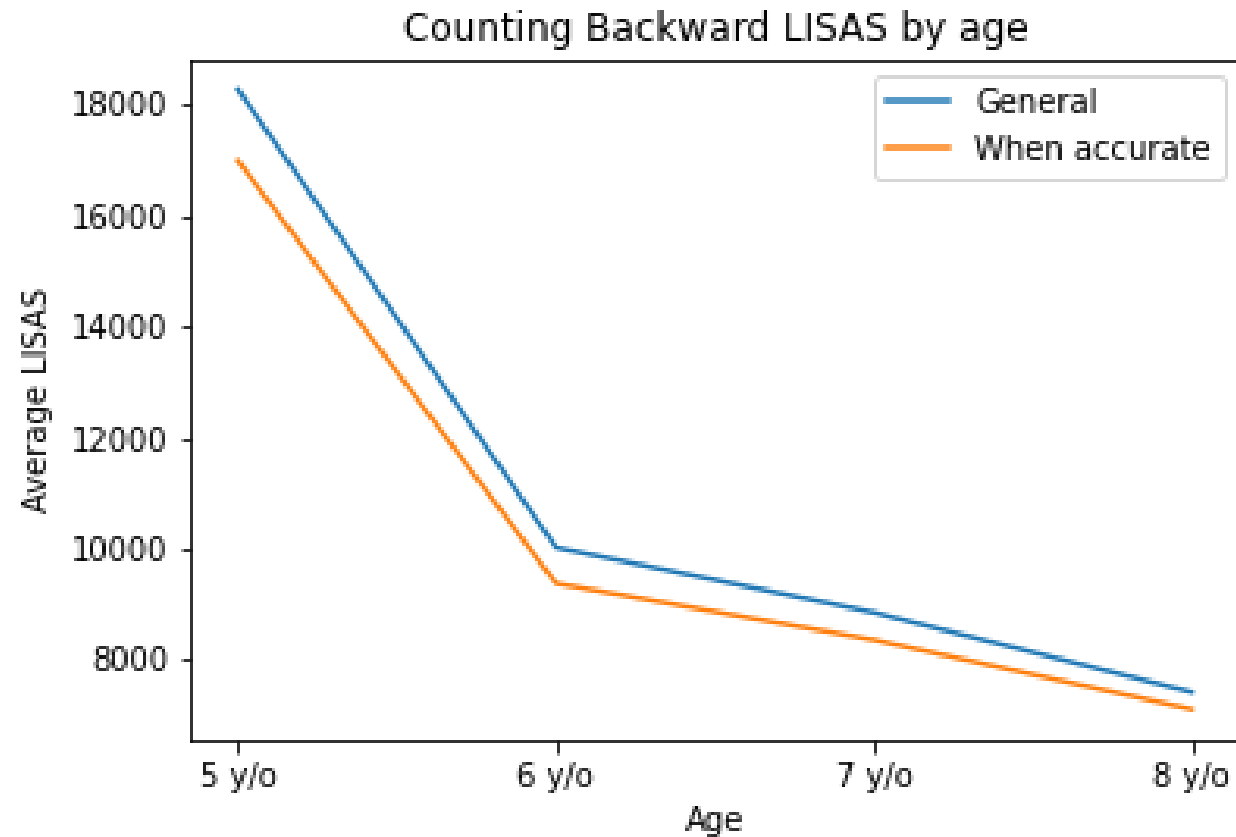
Counting Backward

IES by age
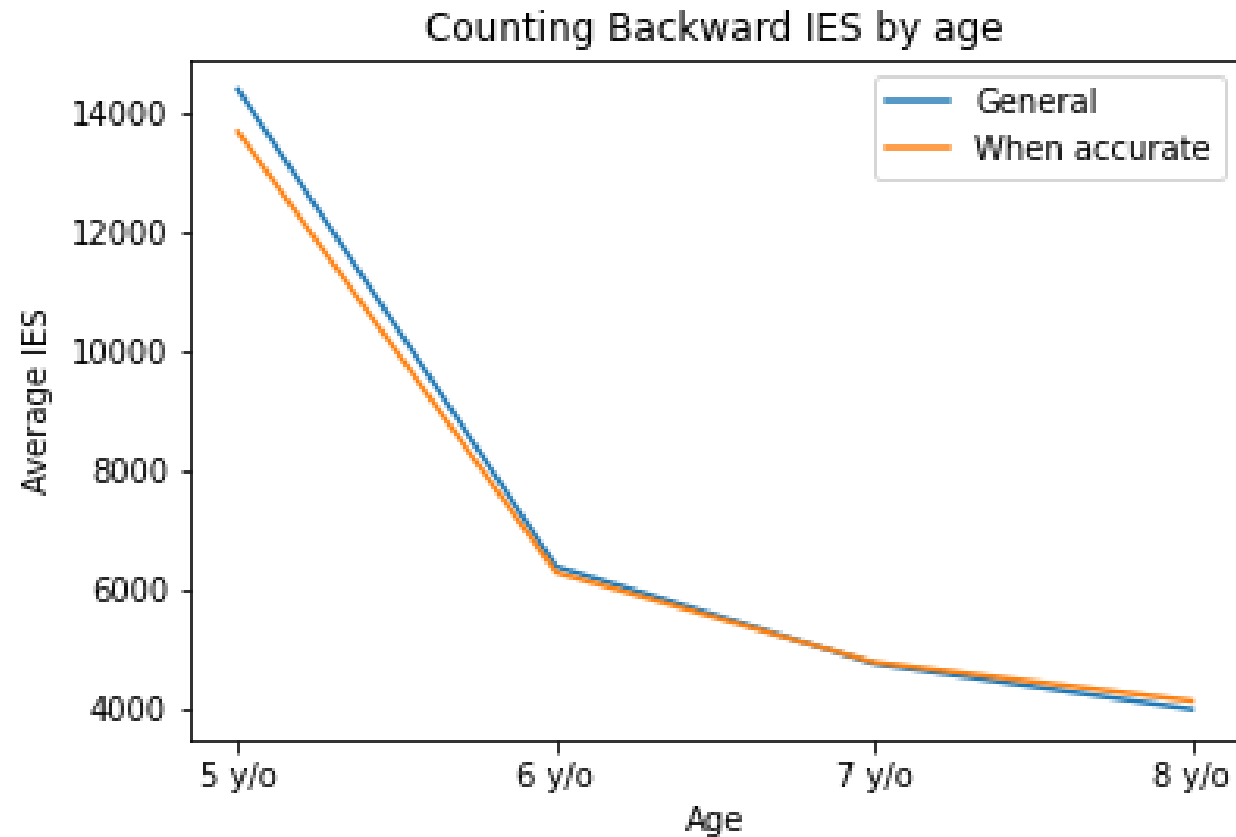
Counting Backward

RCS by age
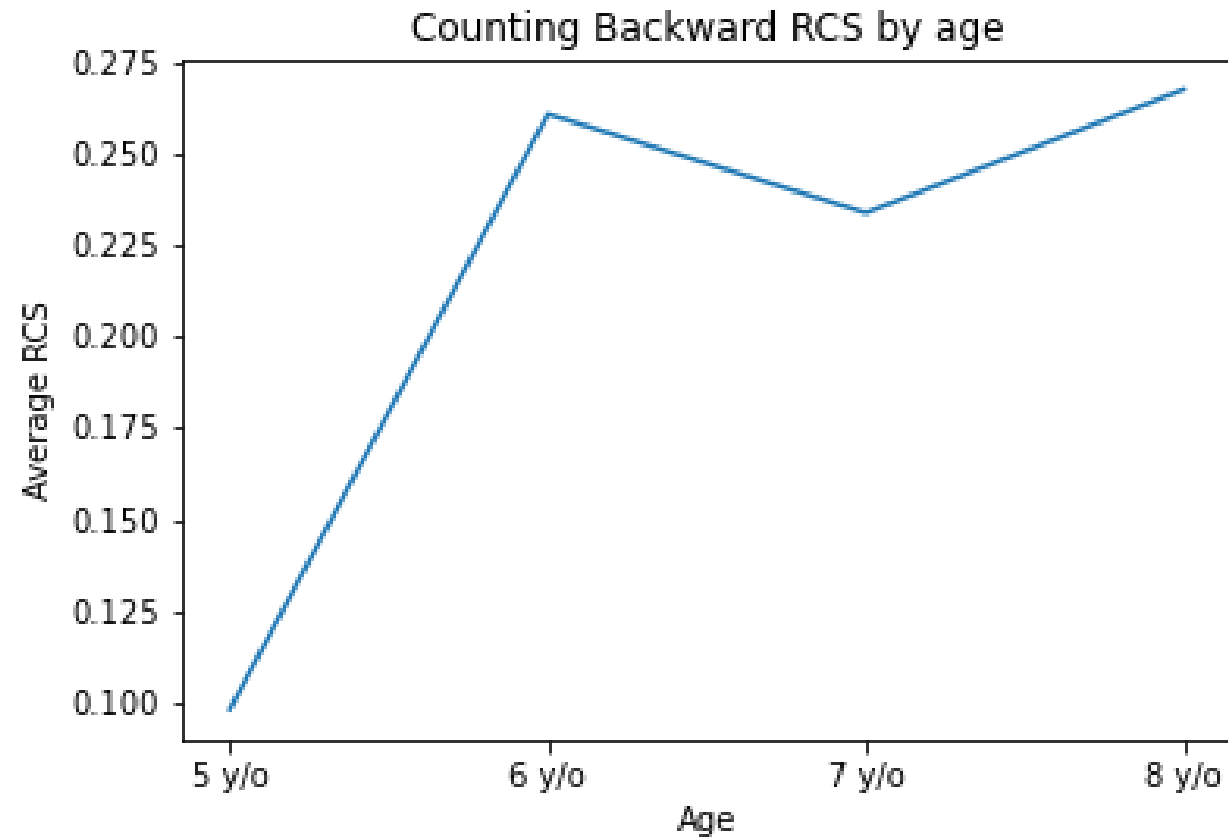
Counting Backward

RT by age
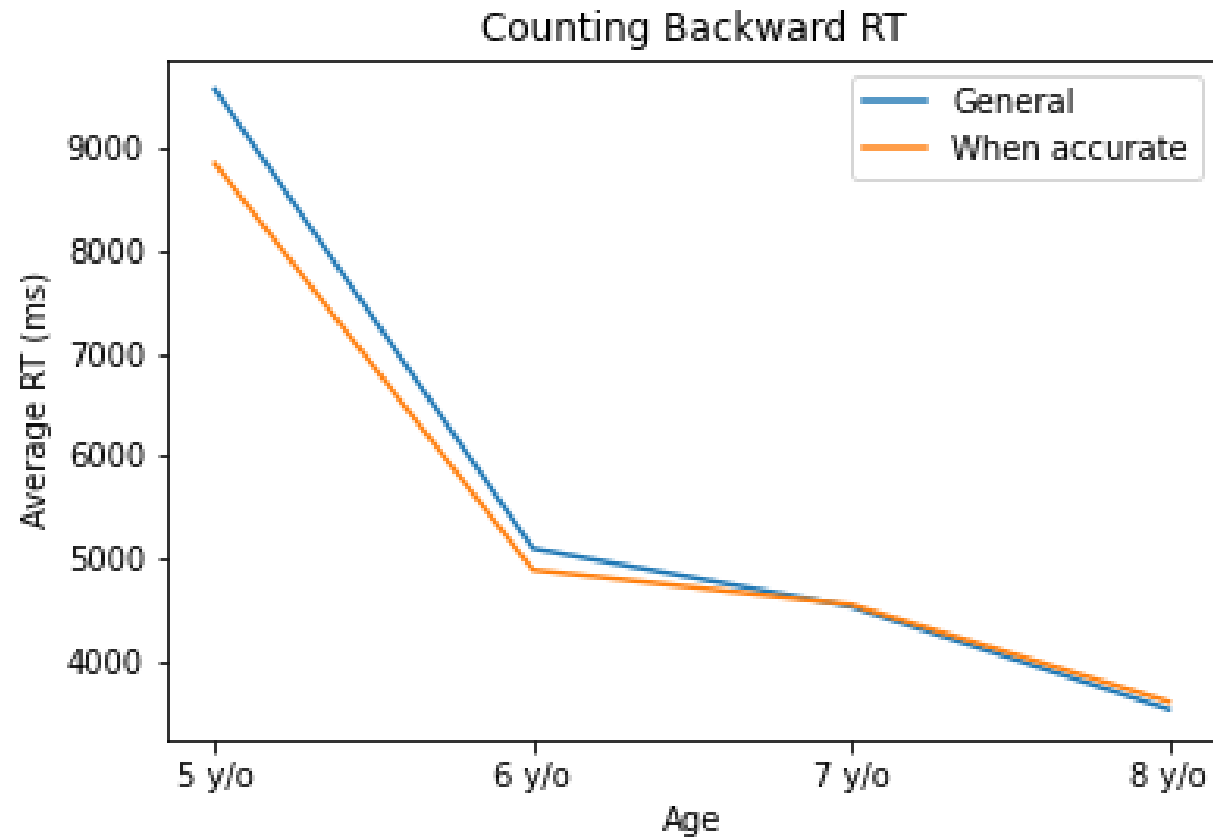
Counting Backward

Accuracy by age
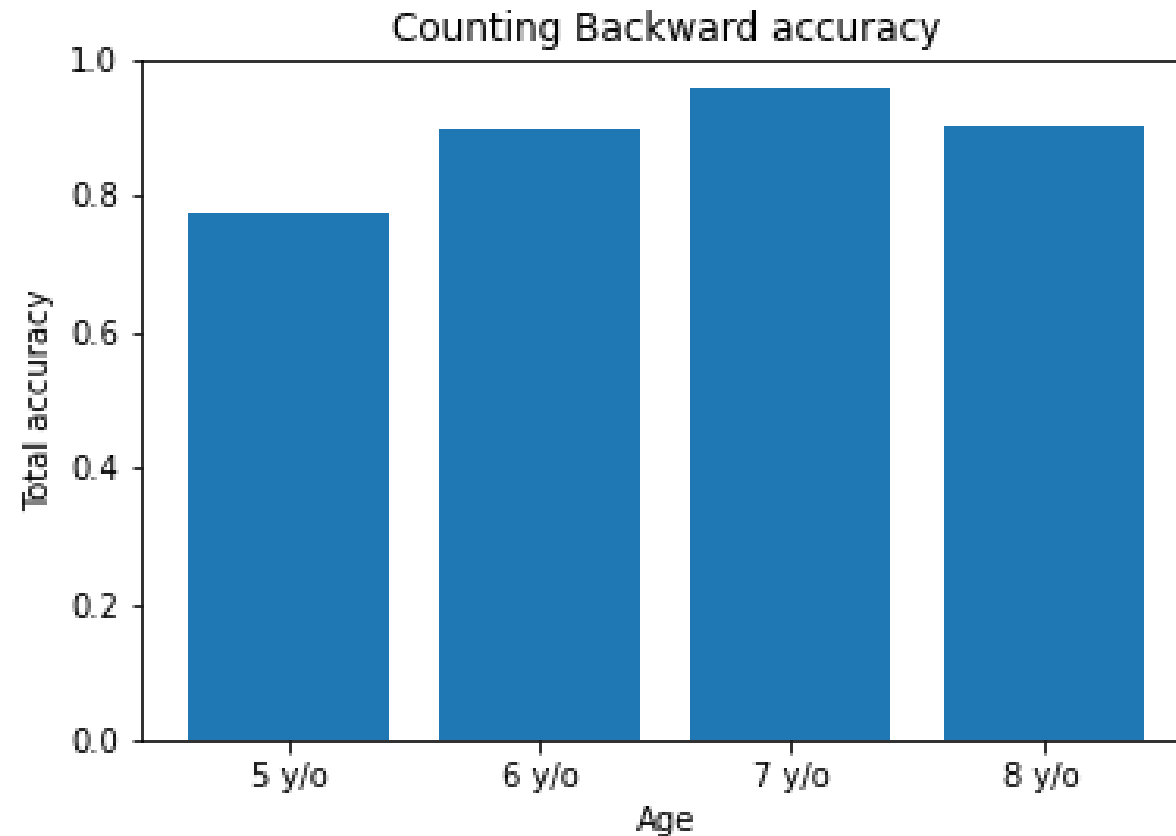
Simple Arithmetic Plus

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	24750,44	10815,15	7934,377	6144,448
LISAS when accurate	20781,97	9990,543	6893,59	5774,55
IES	21065,06	7989,253	6396,621	4474,94
IES when accurate	18846,73	7661,176	6120,417	4342,655
RCS	0,059279	0,248326	0,217268	0,260521
Accuracy	0,74375	0,9025	0,952632	0,935714
RT	14827,3	6731,636	5782,567	4141,146

Simple Arithmetic Plus

LISAS by age
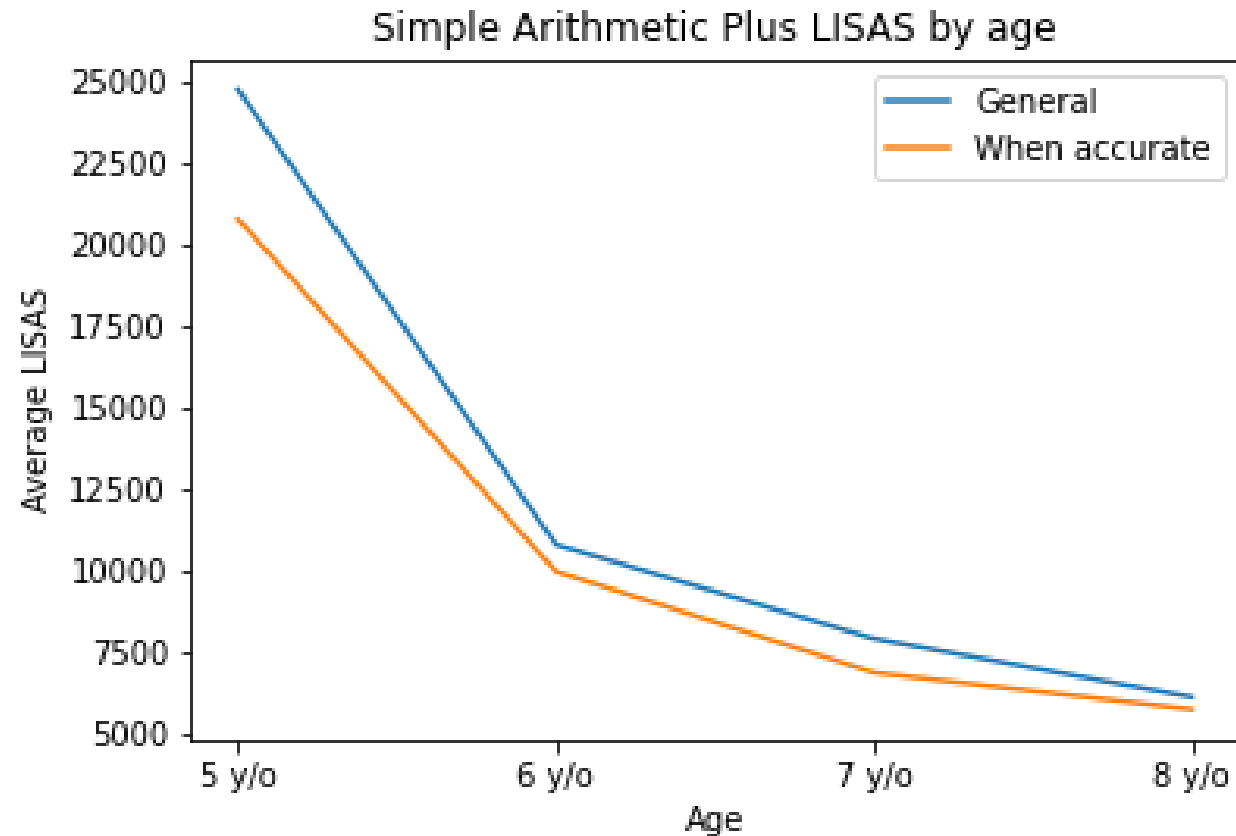
Simple Arithmetic Plus

IES by age
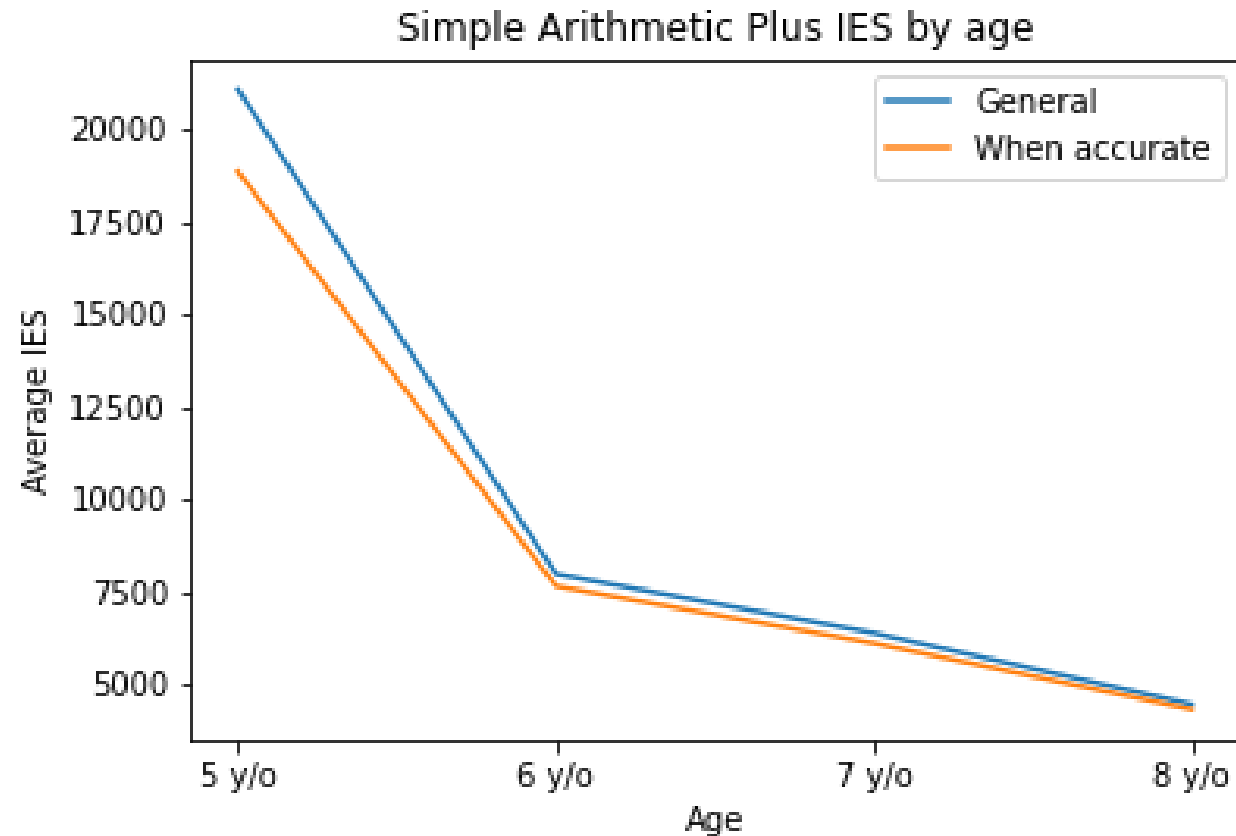
Simple Arithmetic Plus

RCS by age
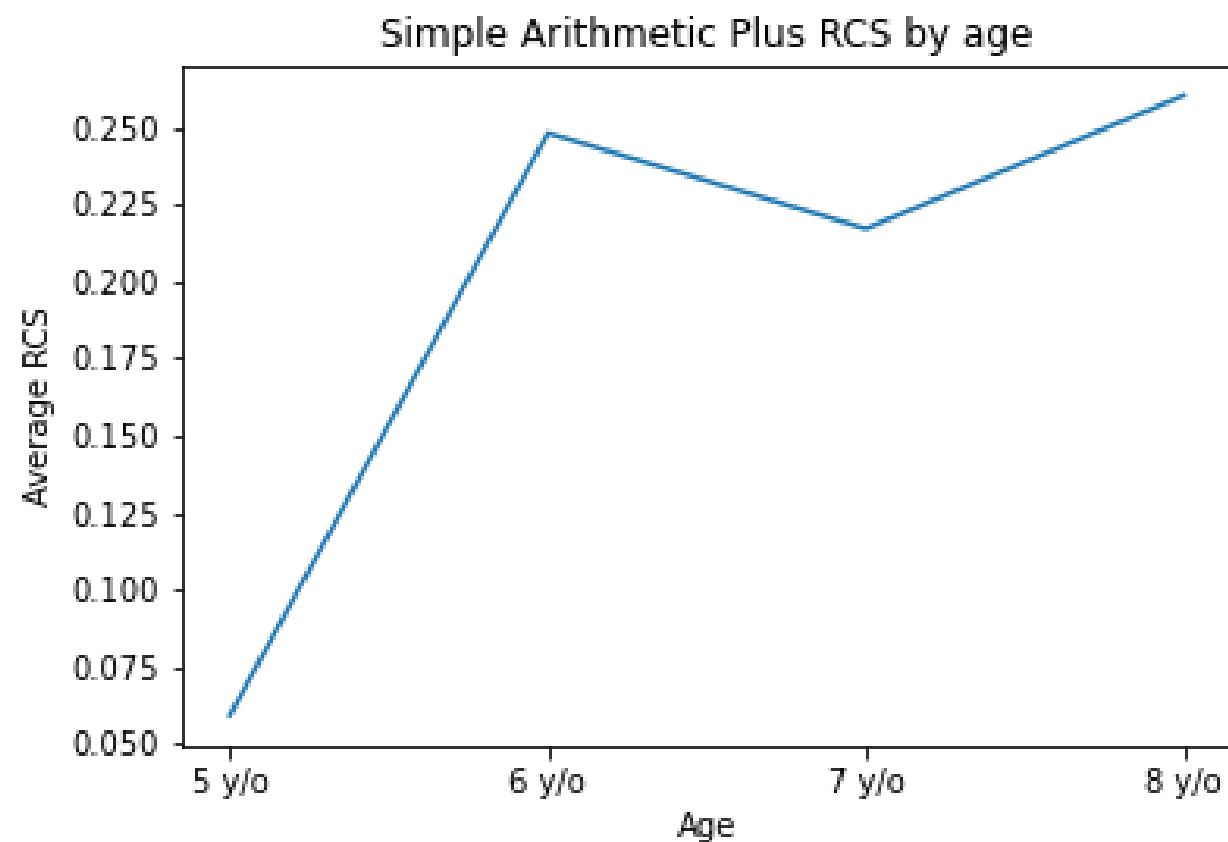
Simple Arithmetic Plus

RT by age
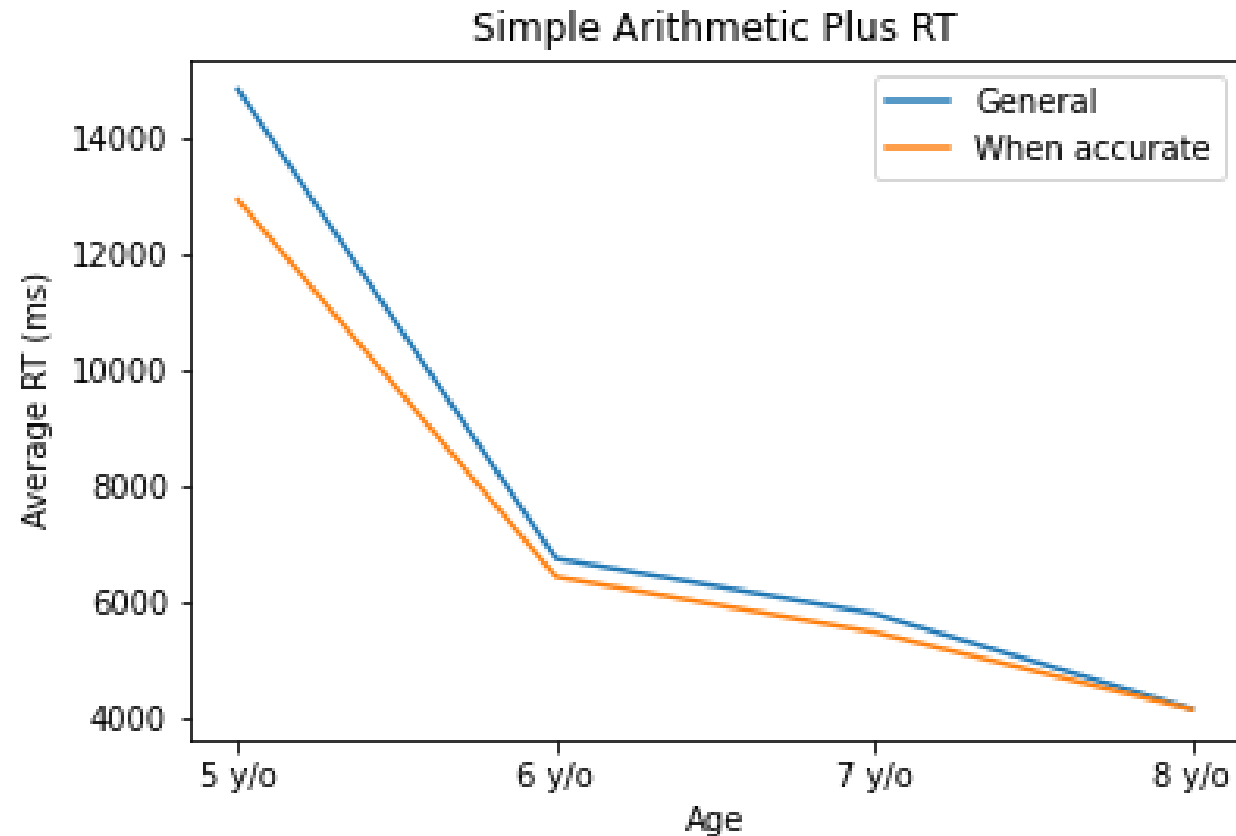
Simple Arithmetic Plus

Accuracy by age
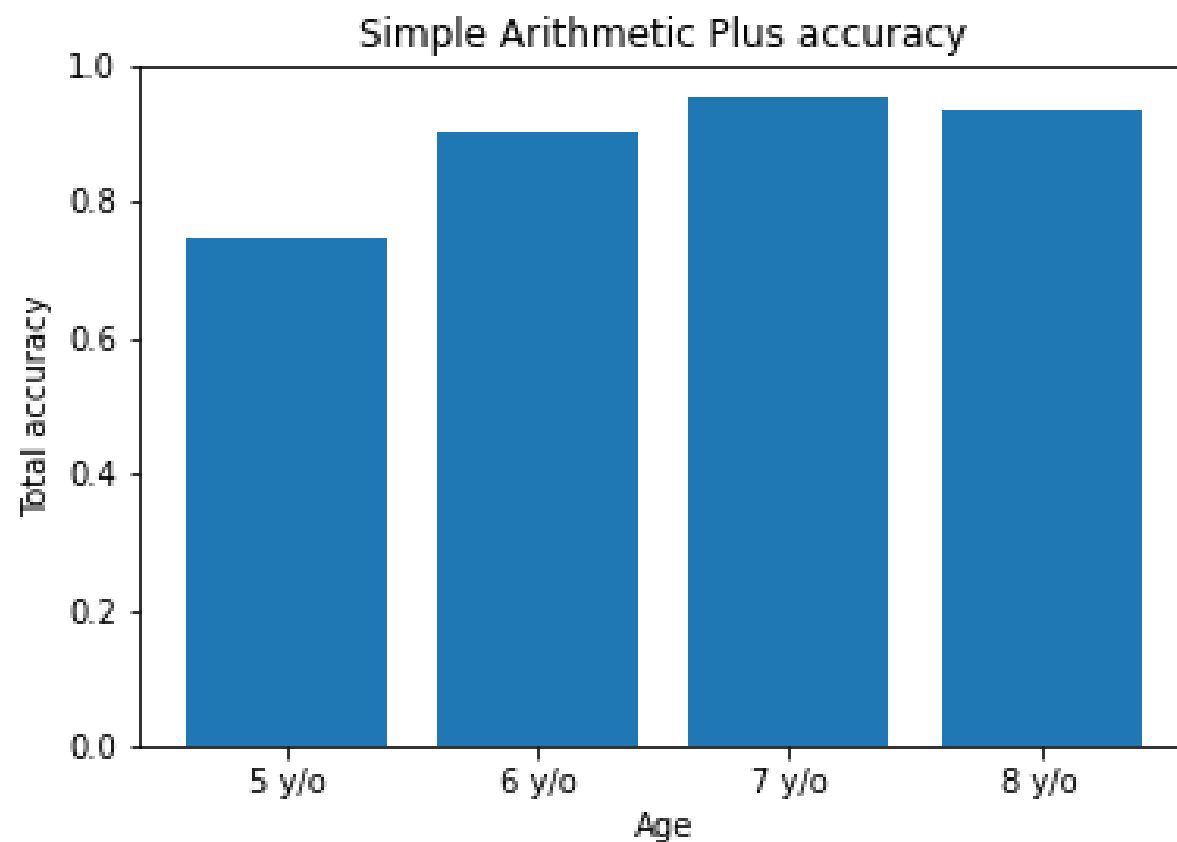
Simple Arithmetic Minus

	5 y/o	6 y/o	7 y/o	8 y/o
LISAS	30330,34	16971,28	15381,32	10411,31
LISAS when accurate	24260,35	15840,9	14069,92	9955,243
IES	45609,73	12093,93	7753,951	5410,227
IES when accurate	35841,02	11097,52	7566,45	5302,148
RCS	0,031622	0,223134	0,165025	0,203451
Accuracy	0,484375	0,815	0,921053	0,907143
RT	16659,26	7664,422	7056,295	4831,63

Simple Arithmetic Minus

LISAS by age
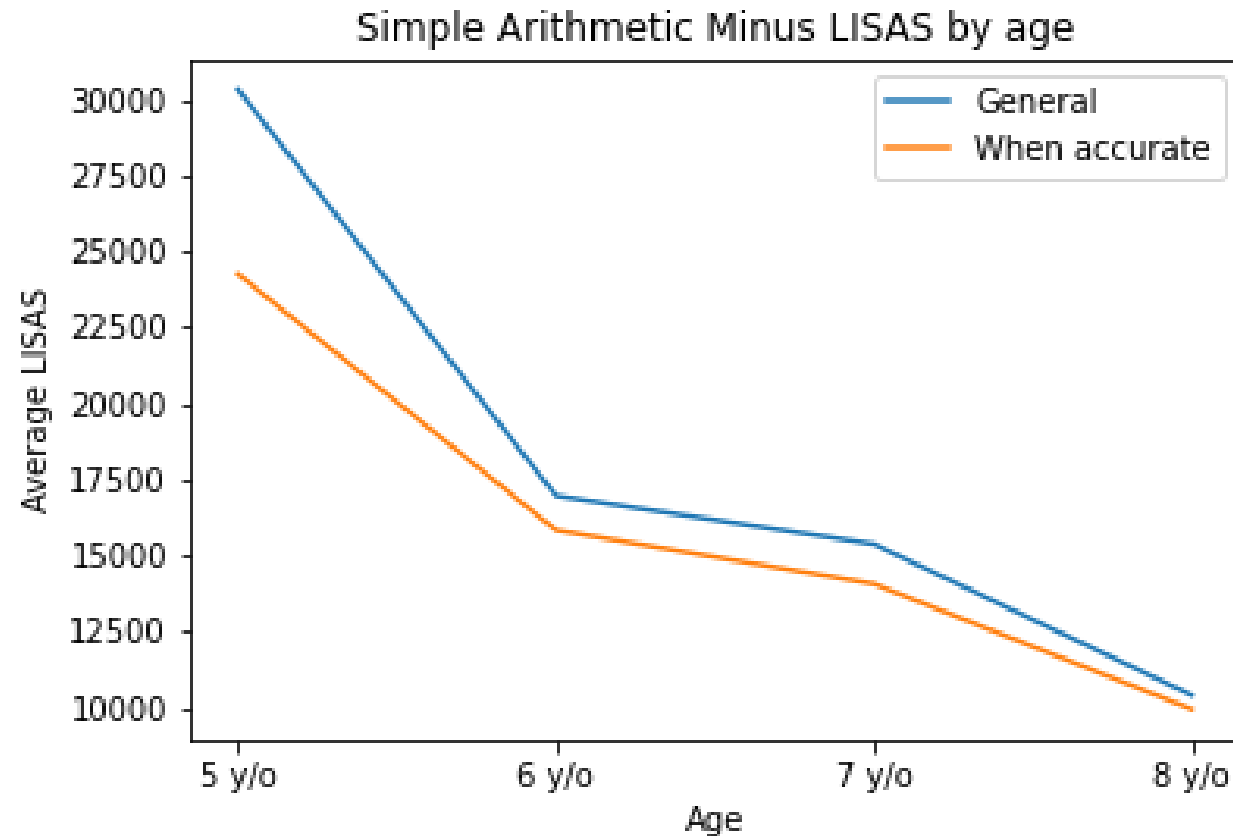
Simple Arithmetic Minus

IES by age
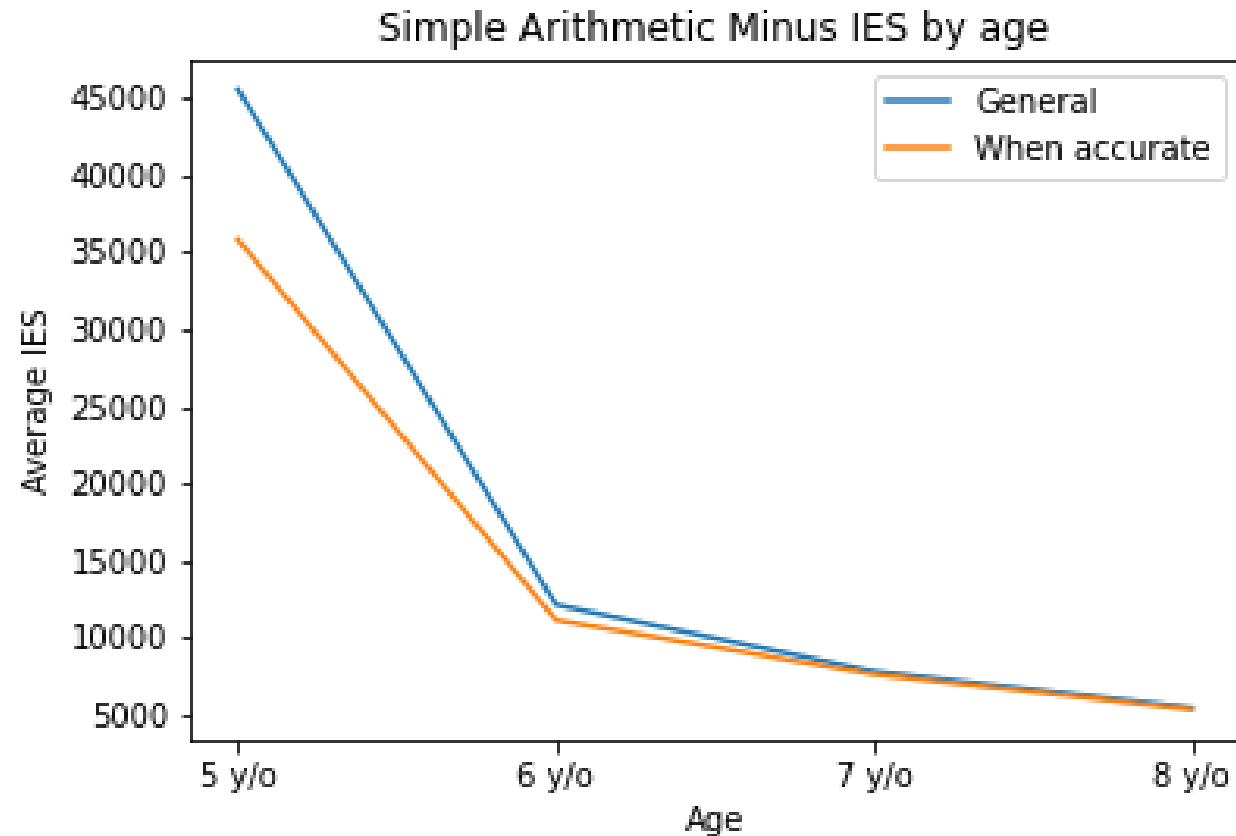
Simple Arithmetic Minus

RCS by age
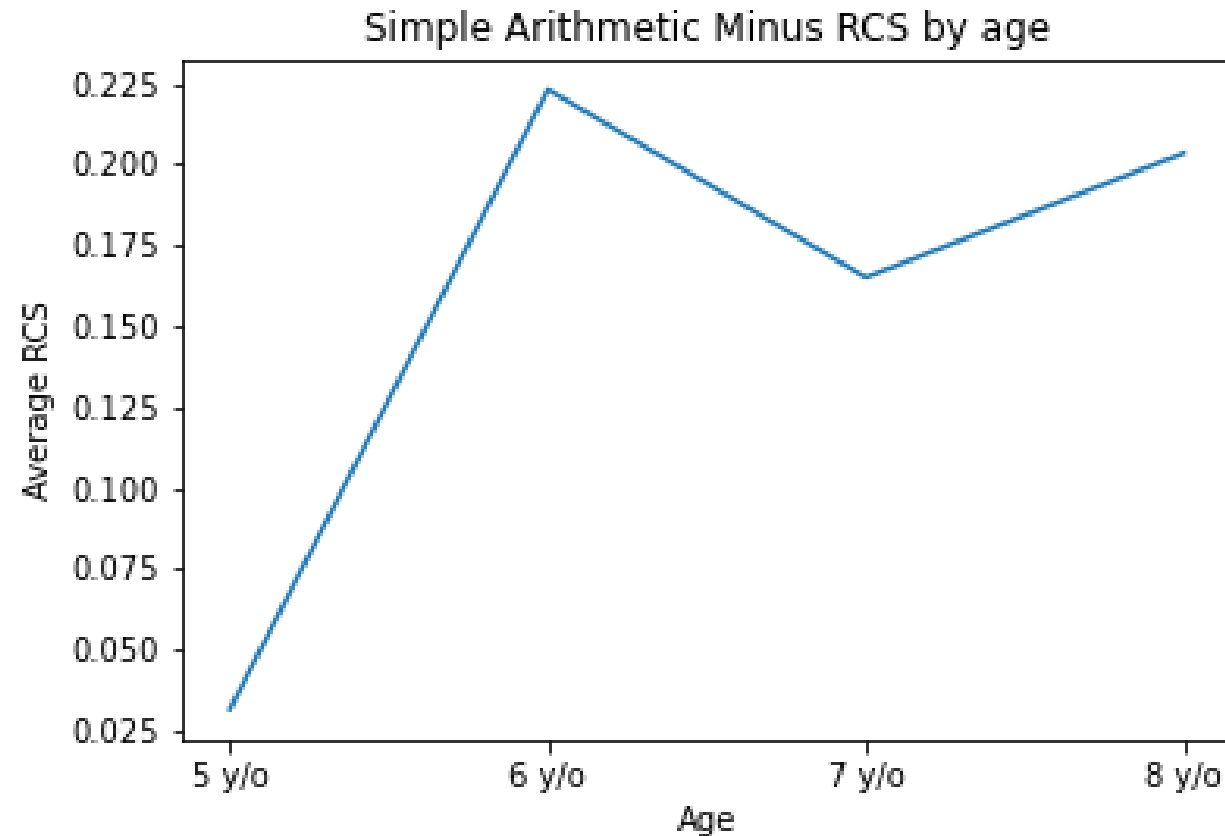
Simple Arithmetic Minus

RT by age
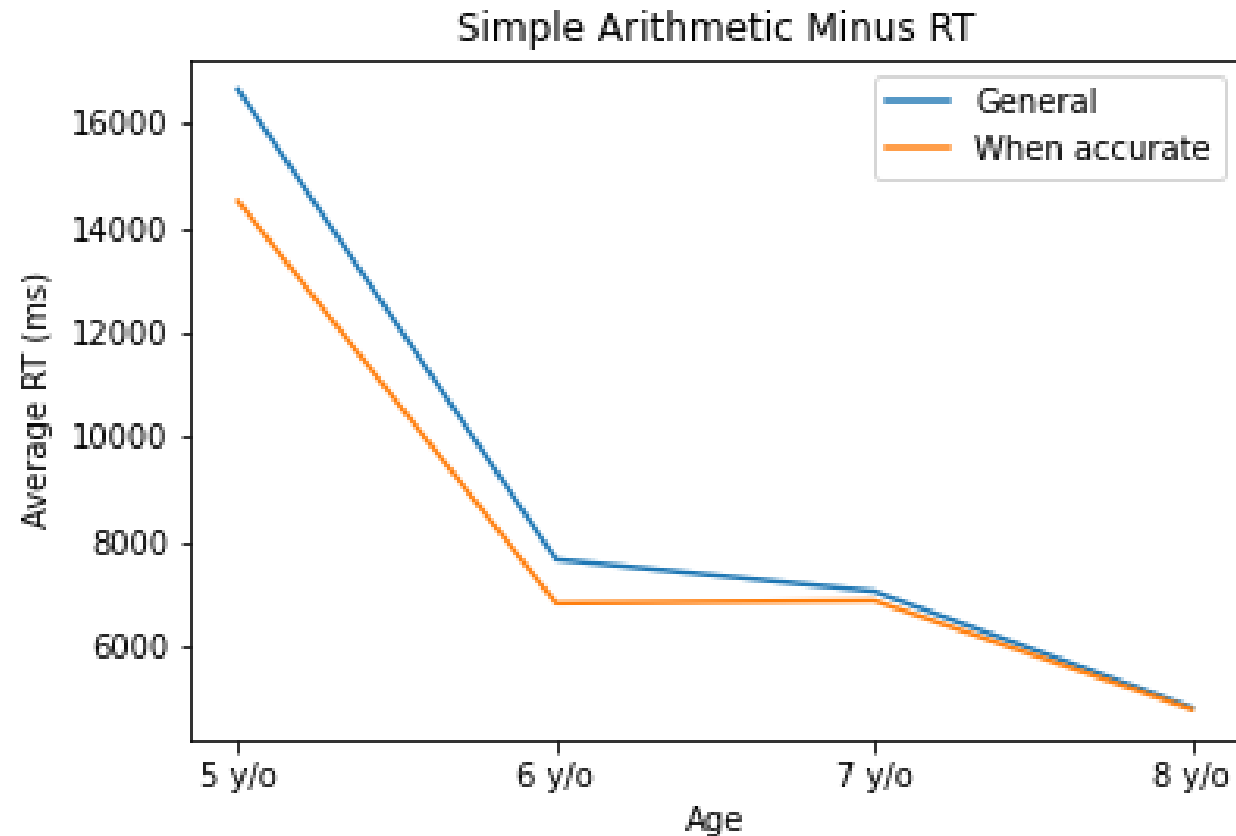
Simple Arithmetic Minus

Accuracy by age
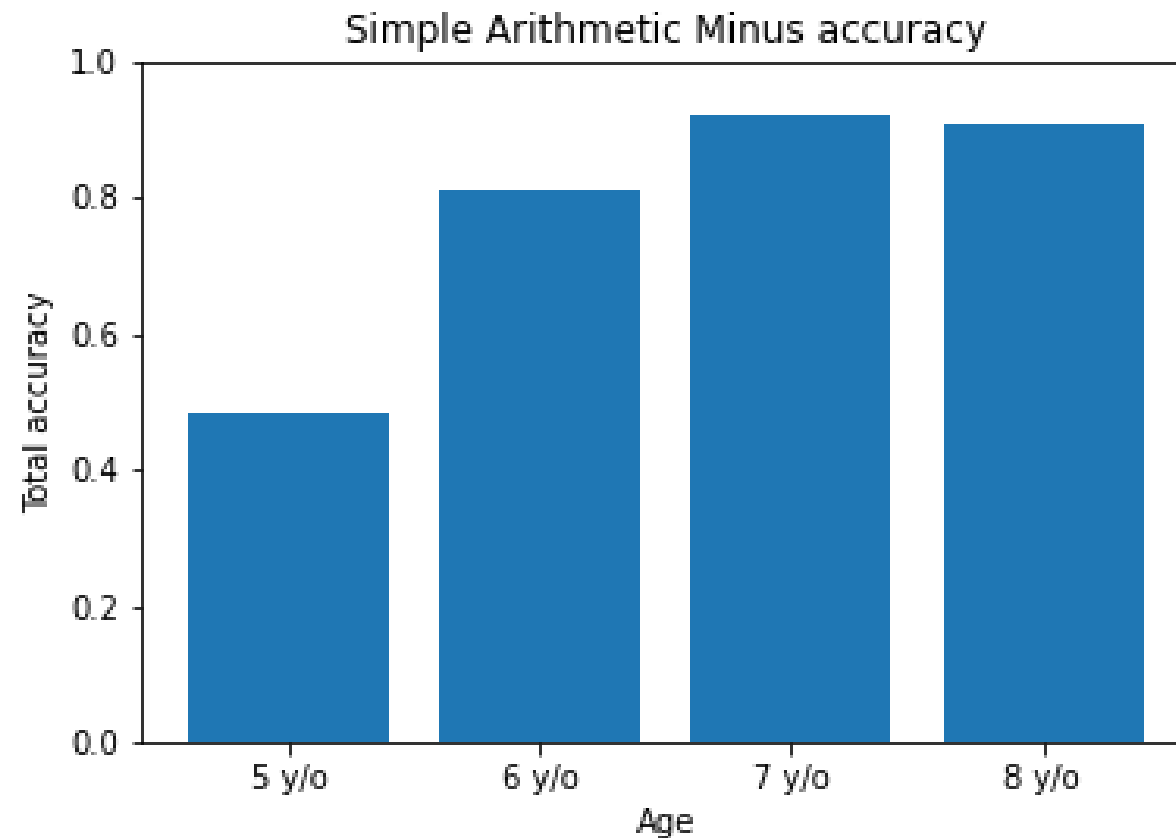
LISAS

Box plot by subtest
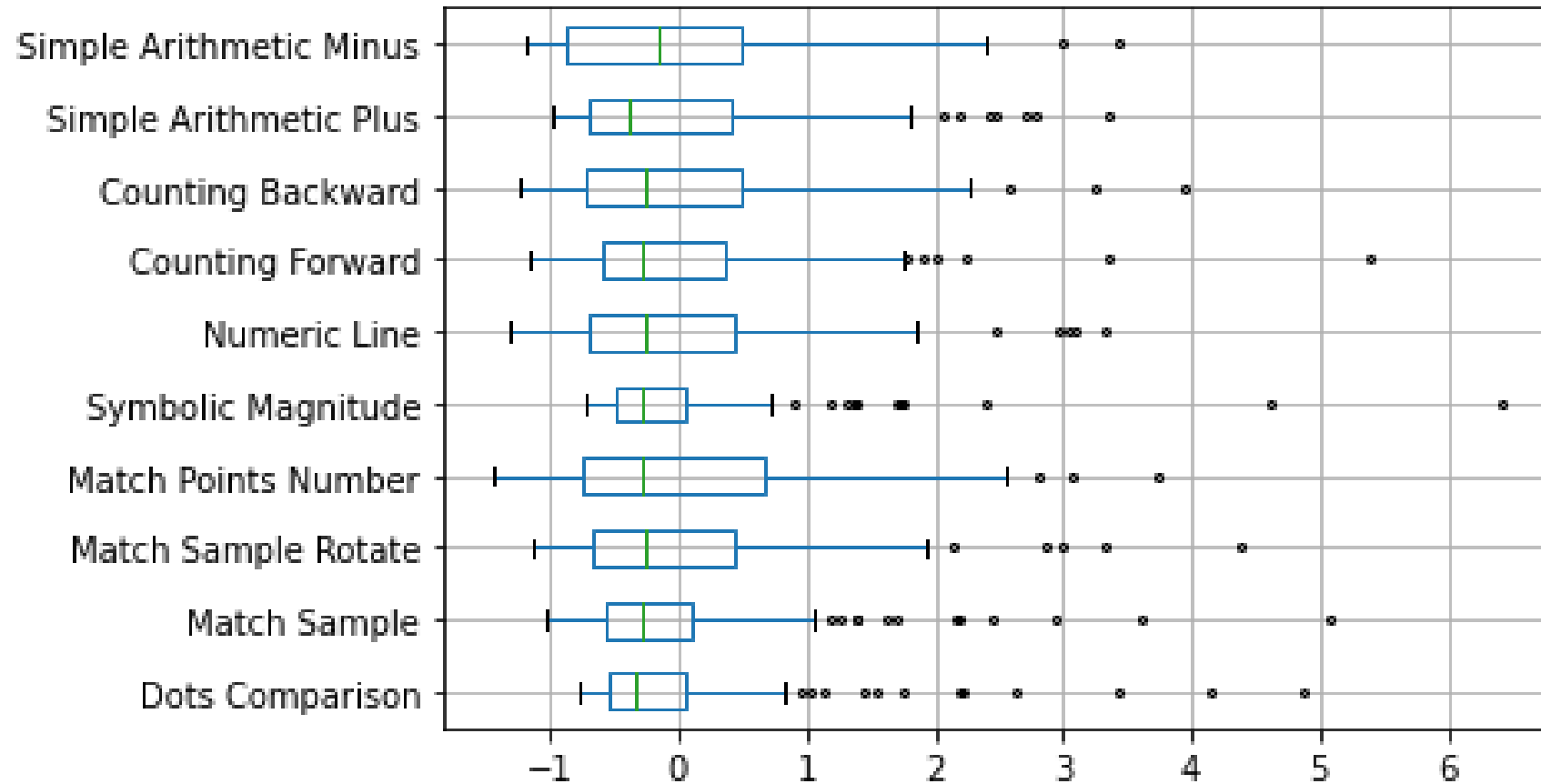
LISAS when accurate

Box plot by subtest
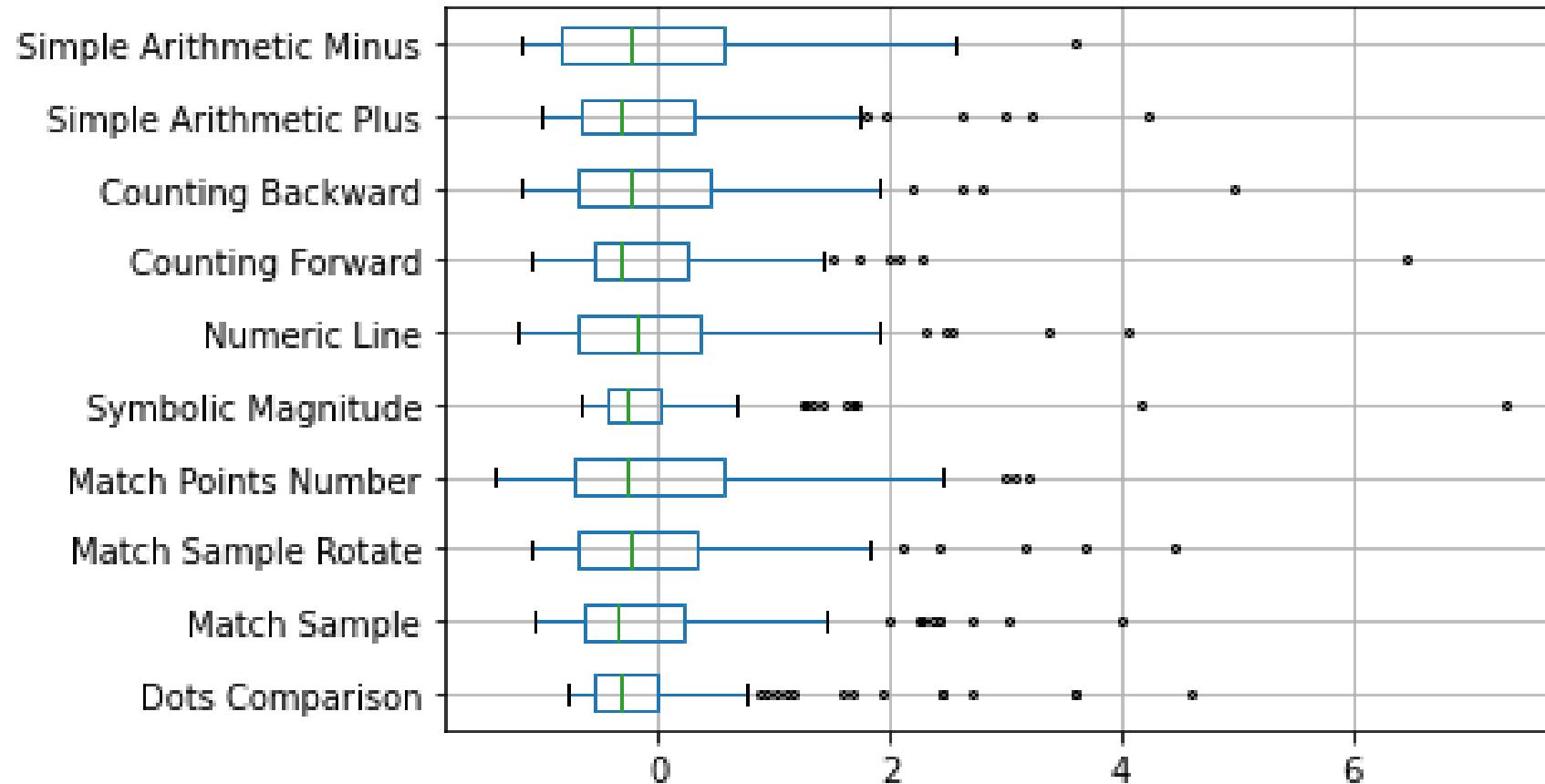
IES

Box plot by subtest
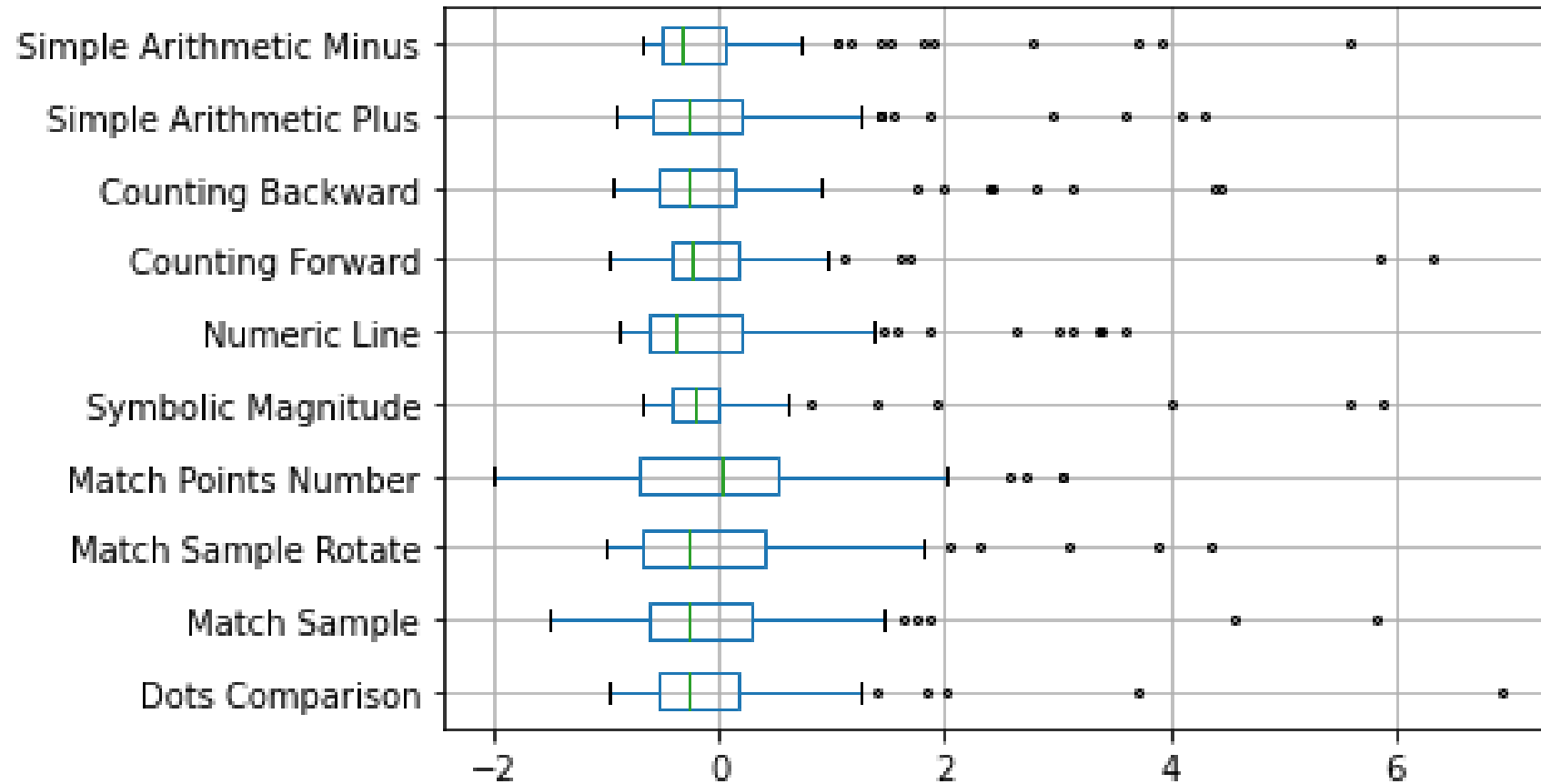
IES when accurate

Box plot by subtest
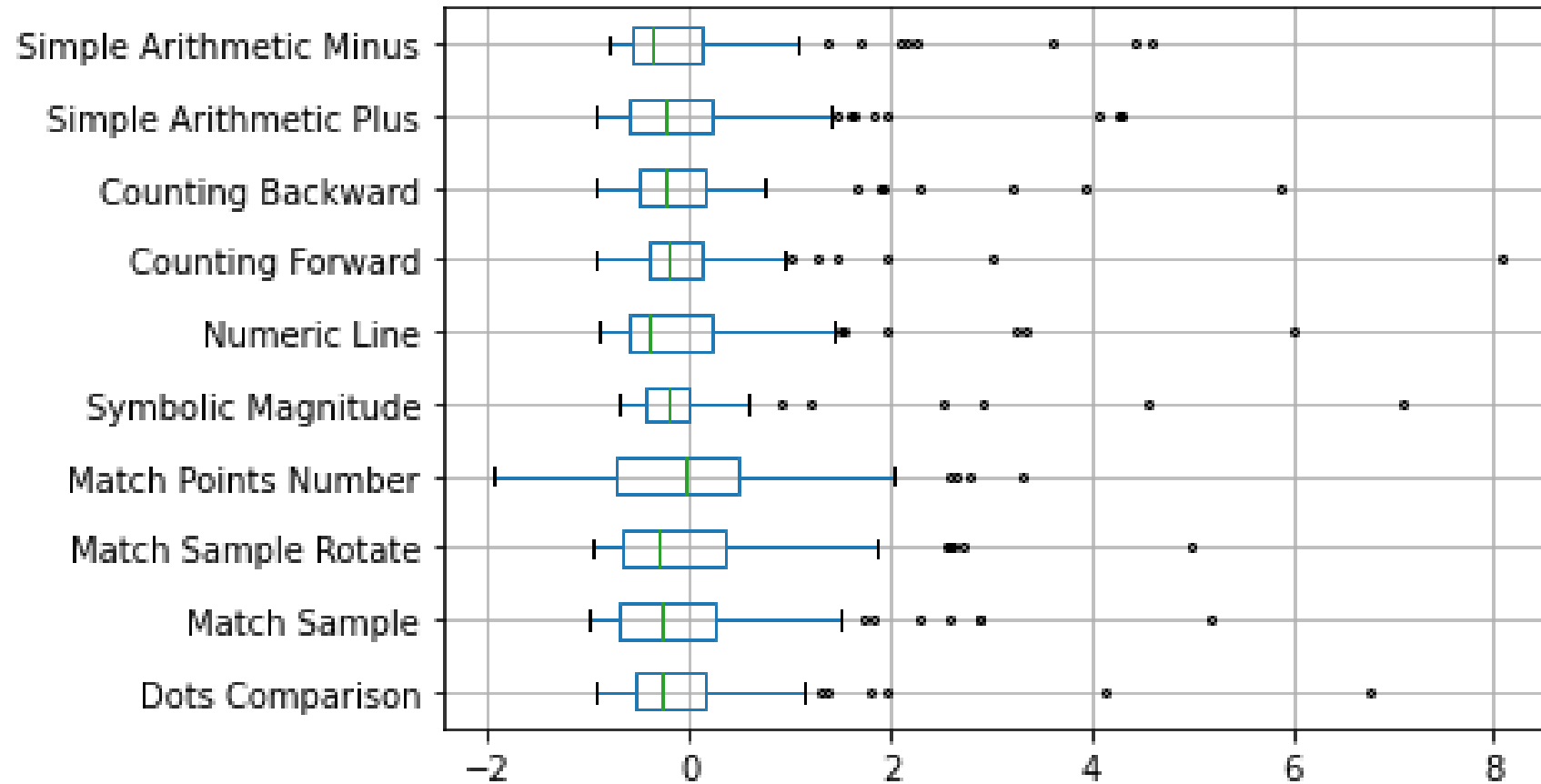
RCS

Box plot by subtest
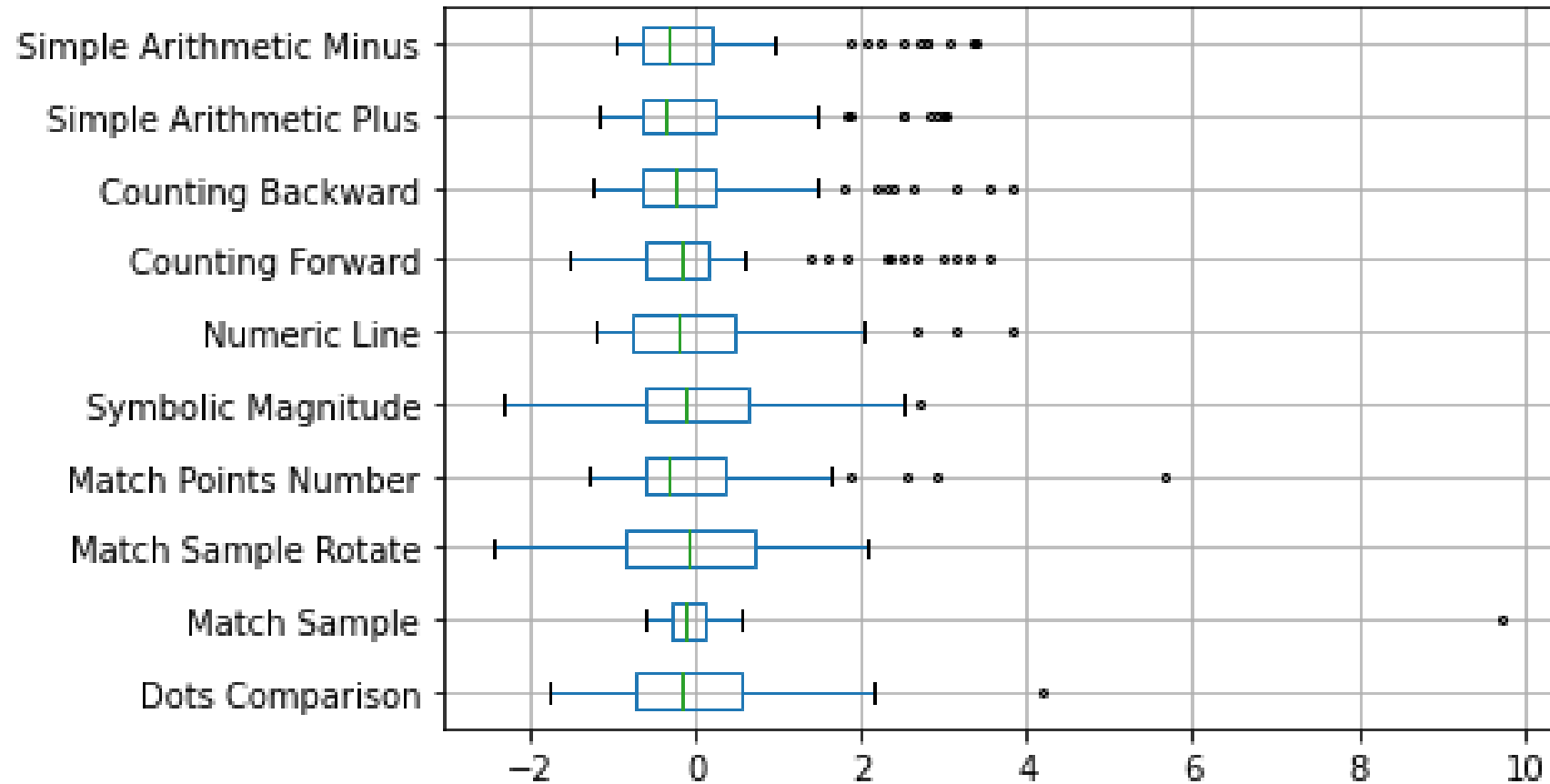
LISAS correlation matrix

	Dots Comparison	Match Sample	Match Sample Rotate	Match Points Number	Symbolic Magnitude	Numeric Line	Counting Forward	Counting Backward	Simple Arithmetic Plus	Simple Arithmetic Minus
Dots Comparison	1	0,167773	0,218122	0,203129	0,310356	0,247294	0,264265	0,264042	0,282338	0,341732
Match Sample	0,167773	1	0,422376	0,182668	0,226466	0,257526	0,090285	0,183146	0,199231	0,209946
Match Sample Rotate	0,218122	0,422376	1	0,305978	0,172576	0,249958	0,223728	0,118297	0,271454	0,330502
Match Points Number	0,203129	0,182668	0,305978	1	0,366347	0,244644	0,297797	0,342005	0,368977	0,361351
Symbolic Magnitude	0,310356	0,226466	0,172576	0,366347	1	0,221329	0,270757	0,444292	0,485148	0,457904
Numeric Line	0,247294	0,257526	0,249958	0,244644	0,221329	1	0,247093	0,242773	0,356356	0,380123
Counting Forward	0,264265	0,090285	0,223728	0,297797	0,270757	0,247093	1	0,638079	0,500729	0,31883
Counting Backward	0,264042	0,183146	0,118297	0,342005	0,444292	0,242773	0,638079	1	0,639928	0,383913
Simple Arithmetic Plus	0,282338	0,199231	0,271454	0,368977	0,485148	0,356356	0,500729	0,639928	1	0,59339
Simple Arithmetic Minus	0,341732	0,209946	0,330502	0,361351	0,457904	0,380123	0,31883	0,383913	0,59339	1

LISAS when accurate correlation matrix

	Dots Comparison	Match Sample	Match Sample Rotate	Match Points Number	Symbolic Magnitude	Numeric Line	Counting Forward	Counting Backward	Simple Arithmetic Plus	Simple Arithmetic Minus
Dots Comparison	1	0,179859	0,233632	0,19915	0,23464	0,221613	0,284316	0,290623	0,253636	0,306828
Match Sample	0,179859	1	0,420055	0,209938	0,324372	0,218471	0,071425	0,114207	0,216422	0,30202
Match Sample Rotate	0,233632	0,420055	1	0,280896	0,106327	0,257067	0,132187	0,140298	0,219676	0,286138
Match Points Number	0,19915	0,209938	0,280896	1	0,359262	0,244984	0,284728	0,341446	0,334081	0,307989
Symbolic Magnitude	0,23464	0,324372	0,106327	0,359262	1	0,202214	0,256827	0,351603	0,349965	0,341146
Numeric Line	0,221613	0,218471	0,257067	0,244984	0,202214	1	0,17701	0,182325	0,274277	0,288556
Counting Forward	0,284316	0,071425	0,132187	0,284728	0,256827	0,17701	1	0,728093	0,566421	0,34092
Counting Backward	0,290623	0,114207	0,140298	0,341446	0,351603	0,182325	0,728093	1	0,638659	0,370913
Simple Arithmetic Plus	0,253636	0,216422	0,219676	0,334081	0,349965	0,274277	0,566421	0,638659	1	0,590275
Simple Arithmetic Minus	0,306828	0,30202	0,286138	0,307989	0,341146	0,288556	0,34092	0,370913	0,590275	1

IES correlation matrix

	Dots Comparison	Match Sample	Match Sample Rotate	Match Points Number	Symbolic Magnitude	Numeric Line	Counting Forward	Counting Backward	Simple Arithmetic Plus	Simple Arithmetic Minus
Dots Comparison	1	0,117638	0,314496	0,373334	0,262139	0,254506	0,315778	0,362505	0,321742	0,204673
Match Sample	0,117638	1	0,438032	0,405981	0,526977	0,125789	0,176592	0,237485	0,528152	0,43399
Match Sample Rotate	0,314496	0,438032	1	0,558948	0,52794	0,280444	0,374738	0,43495	0,506014	0,521703
Match Points Number	0,373334	0,405981	0,558948	1	0,559657	0,320312	0,575761	0,554233	0,654608	0,577227
Symbolic Magnitude	0,262139	0,526977	0,52794	0,559657	1	0,198472	0,446767	0,582962	0,794165	0,654606
Numeric Line	0,254506	0,125789	0,280444	0,320312	0,198472	1	0,315483	0,290693	0,314919	0,181701
Counting Forward	0,315778	0,176592	0,374738	0,575761	0,446767	0,315483	1	0,862256	0,706163	0,569917
Counting Backward	0,362505	0,237485	0,43495	0,554233	0,582962	0,290693	0,862256	1	0,721217	0,625897
Simple Arithmetic Plus	0,321742	0,528152	0,506014	0,654608	0,794165	0,314919	0,706163	0,721217	1	0,937282
Simple Arithmetic Minus	0,204673	0,43399	0,521703	0,577227	0,654606	0,181701	0,569917	0,625897	0,937282	1

IES when accurate correlation matrix

	Dots Comparison	Match Sample	Match Sample Rotate	Match Points Number	Symbolic Magnitude	Numeric Line	Counting Forward	Counting Backward	Simple Arithmetic Plus	Simple Arithmetic Minus
Dots Comparison	1	0,11078	0,32434	0,360996	0,225236	0,277751	0,265192	0,30608	0,291207	0,252718
Match Sample	0,11078	1	0,323744	0,444011	0,458767	0,17796	0,166296	0,21292	0,503865	0,455731
Match Sample Rotate	0,32434	0,323744	1	0,476252	0,373878	0,375173	0,264673	0,341812	0,407335	0,405162
Match Points Number	0,360996	0,444011	0,476252	1	0,511156	0,323236	0,537577	0,529388	0,673702	0,667403
Symbolic Magnitude	0,225236	0,458767	0,373878	0,511156	1	0,328308	0,345967	0,507206	0,676208	0,685893
Numeric Line	0,277751	0,17796	0,375173	0,323236	0,328308	1	0,271892	0,324156	0,359907	0,339016
Counting Forward	0,265192	0,166296	0,264673	0,537577	0,345967	0,271892	1	0,904122	0,684995	0,680492
Counting Backward	0,30608	0,21292	0,341812	0,529388	0,507206	0,324156	0,904122	1	0,689065	0,705808
Simple Arithmetic Plus	0,291207	0,503865	0,407335	0,673702	0,676208	0,359907	0,684995	0,689065	1	0,951114
Simple Arithmetic Minus	0,252718	0,455731	0,405162	0,667403	0,685893	0,339016	0,680492	0,705808	0,951114	1

RCS correlation matrix

	Dots Comparison	Match Sample	Match Sample Rotate	Match Points Number	Symbolic Magnitude	Numeric Line	Counting Forward	Counting Backward	Simple Arithmetic Plus	Simple Arithmetic Minus
Dots Comparison	1	0,065102	0,481411	0,660078	0,617287	0,606064	0,598091	0,588408	0,675951	0,678321
Match Sample	0,065102	1	0,161972	0,097774	0,11858	0,059059	0,13218	0,142506	0,103775	0,094119
Match Sample Rotate	0,481411	0,161972	1	0,624875	0,640429	0,52938	0,560128	0,633979	0,648093	0,647389
Match Points Number	0,660078	0,097774	0,624875	1	0,71519	0,659792	0,664807	0,635056	0,738615	0,73265
Symbolic Magnitude	0,617287	0,11858	0,640429	0,71519	1	0,660817	0,721683	0,755063	0,798642	0,781918
Numeric Line	0,606064	0,059059	0,52938	0,659792	0,660817	1	0,639524	0,642868	0,733088	0,743574
Counting Forward	0,598091	0,13218	0,560128	0,664807	0,721683	0,639524	1	0,946763	0,850083	0,885241
Counting Backward	0,588408	0,142506	0,633979	0,635056	0,755063	0,642868	0,946763	1	0,881344	0,901953
Simple Arithmetic Plus	0,675951	0,103775	0,648093	0,738615	0,798642	0,733088	0,850083	0,881344	1	0,965909
Simple Arithmetic Minus	0,678321	0,094119	0,647389	0,73265	0,781918	0,743574	0,885241	0,901953	0,965909	1