

# Personality in juvenile Atlantic cod ecotypes and implications for fisheries management.

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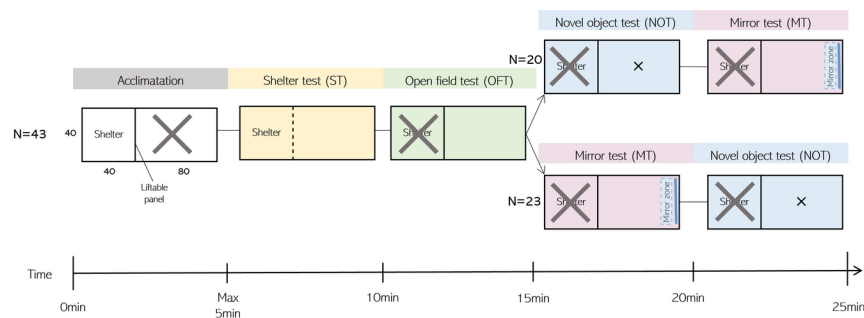
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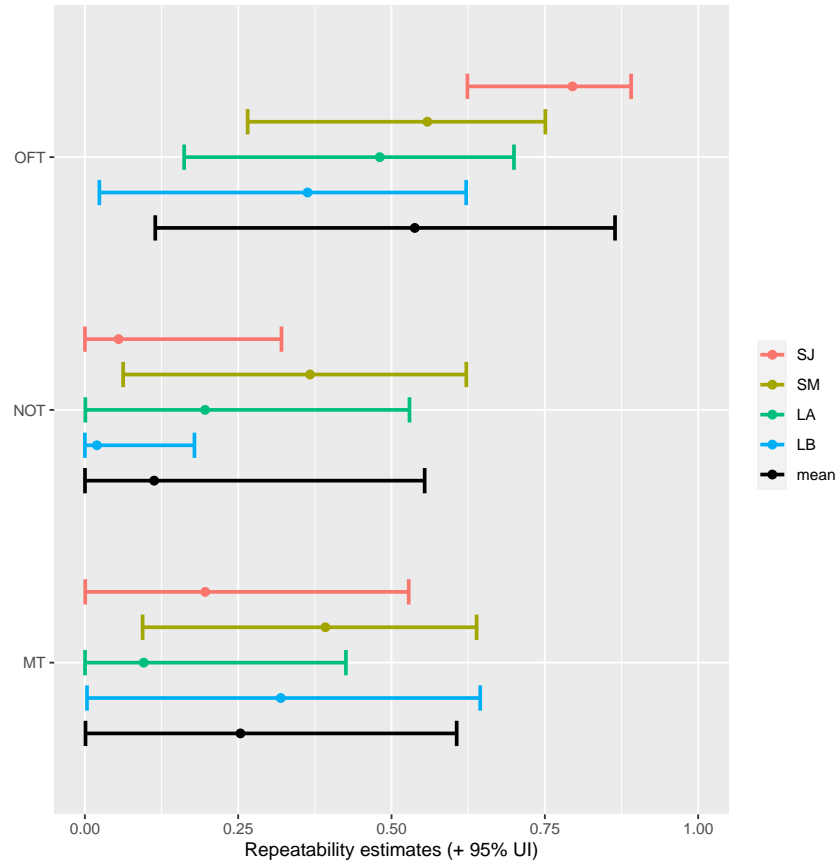
## Abstract

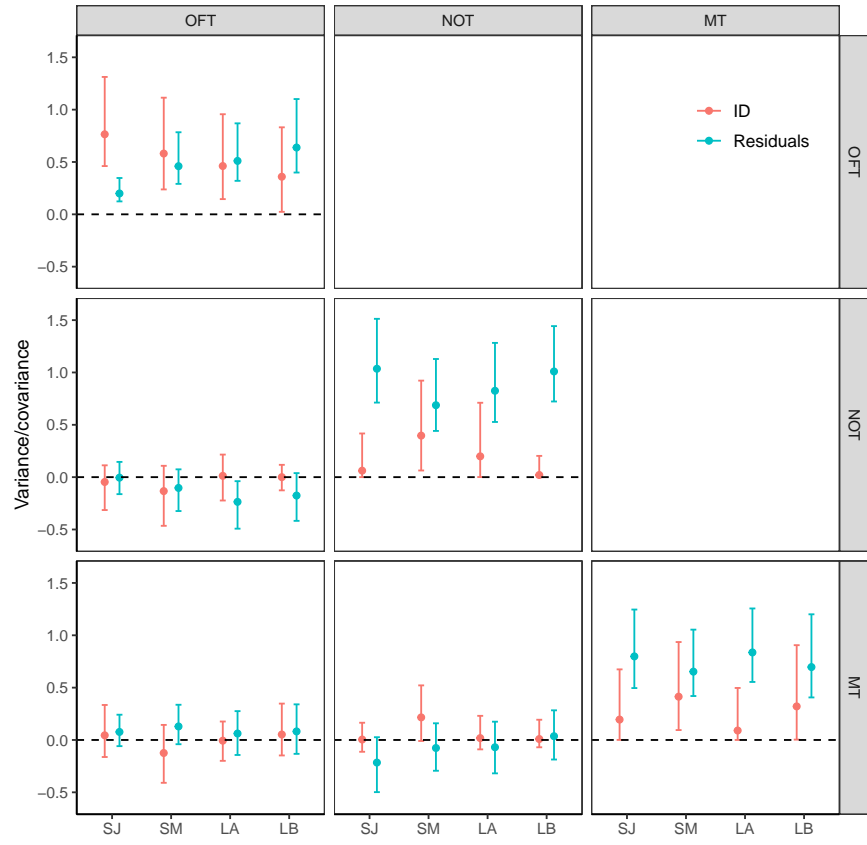
Animals show among-individual variation in behaviours, including migration behaviours, which are often repeatable across time periods and contexts, commonly termed “personality”. These behaviours can be correlated, forming a behavioural syndrome. In this study, we assessed the repeatability and correlation of different behavioural traits i.e., boldness, exploration and sociality and the link to migration patterns in Atlantic cod juveniles. To do so, we collected repeated measurements within two short-term (three days) and two long-term (two months) intervals of these traits and genotypes of the Pan I locus, which is indirectly correlated to feeding migration patterns in this species. We found that mainly exploration behaviour was repeatable in the short- and long-term intervals, and a trend for the relationship between exploration and the Pan I locus. Boldness and sociality were only repeatable in the second short-term interval indicating a possible development of stability over time and did not show a relation with the Pan I locus. We found no indication of behavioural syndromes among the studied traits. Although we were unable to identify the existence of a migration syndrome for the migratory genotype (Pan IBB), this study is the first one to highlight the existence of a possible link between the personality trait exploration and the migration-linked Pan I locus. This supports the need for further research that should focus on the effect of exploration tendency and other personality traits on cod movement, including the migratory (frontal) ecotype, to develop management strategies based on behavioural units, rather than treating the population as a single homogeneous stock.

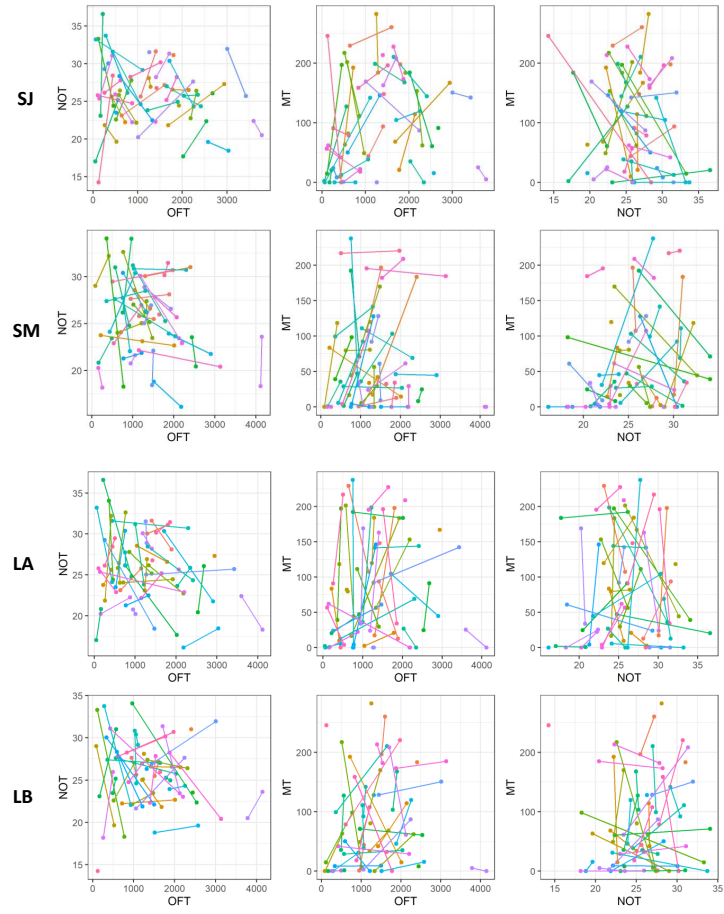
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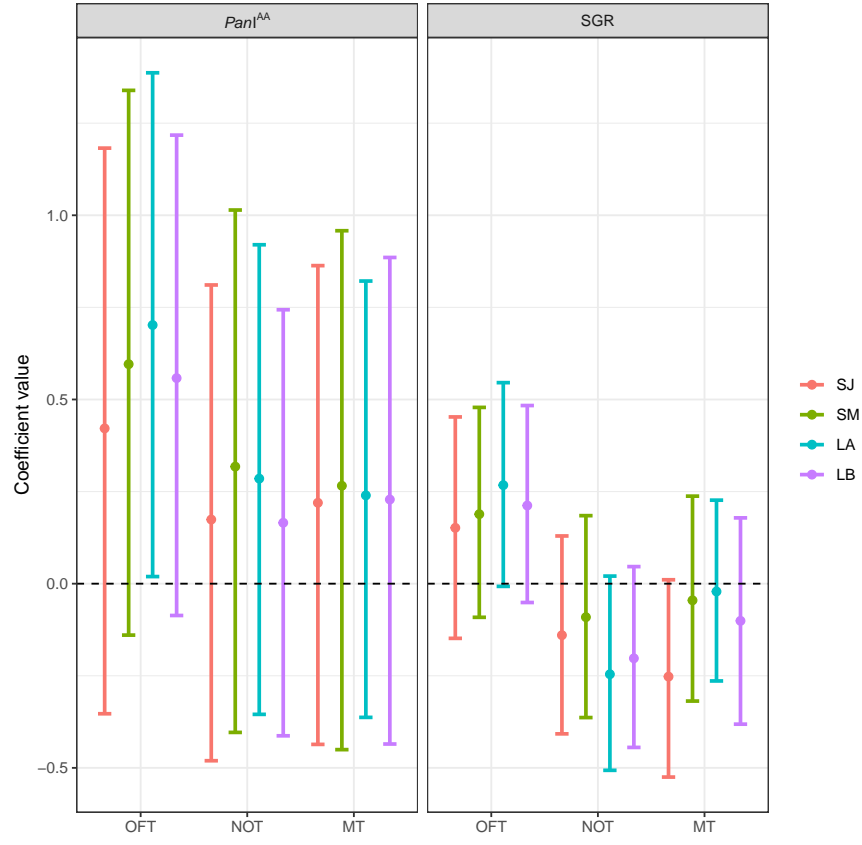
Beukeboom et al. Cod\_ecology evolution-unlinked.docx available at <https://authorea.com/users/473079/articles/610032-personality-in-juvenile-atlantic-cod-ecotypes-and-implications-for-fisheries-management>

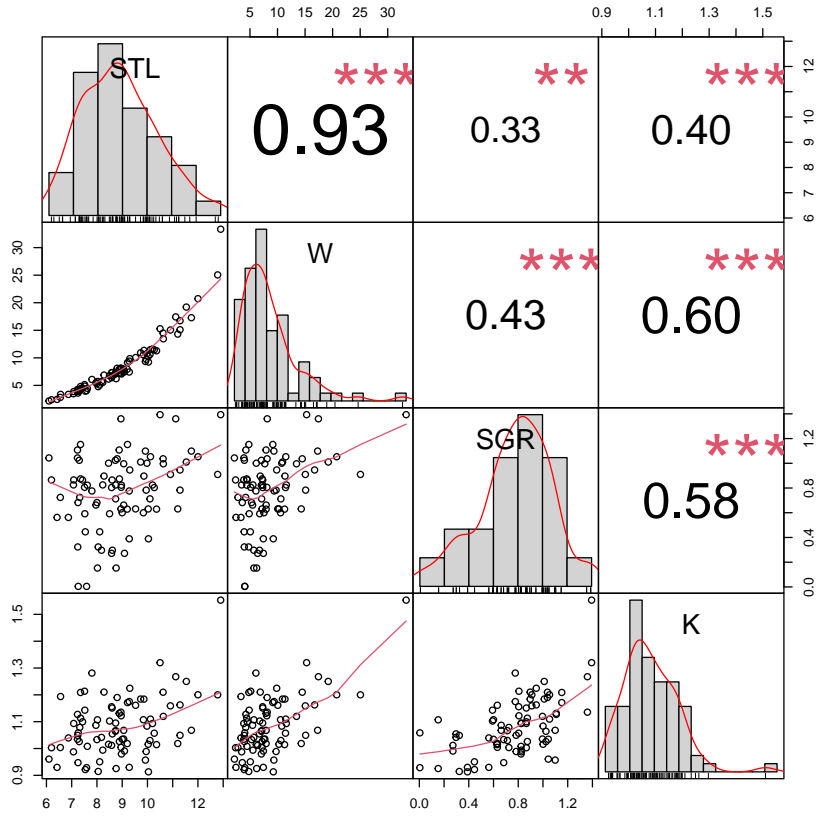












<b>SJ</b>	<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>
Predictor						
<b>ID-level</b>						
Measurement	0.76	0.46 – 1.31	0.06	0.00 – 0.42	0.19	0.00 – 0.67
Allele ( <i>Pan<sup>AA</sup></i> )	0.42	-0.35 – 1.18	-0.17	-0.48 – 0.81	0.22	-0.44 – 0.86
SGR	0.15	-0.15 – 0.45	-0.14	-0.41 – 0.13	-0.25	-0.52 – 0.01
Trial	0.23	-0.02 – 0.47	-0.16	-0.66 – 0.34	0.12	-0.30 – 0.57
Shelter leave	0.51	0.13 – 0.90	-0.16	-0.73 – 0.41	0.31	-0.26 – 0.88
Object/Mirror order			-0.10	-0.60 – 0.40	0.25	-0.25 – 0.76
<b>Residual-level</b>						
Measurement	0.2	0.12 – 0.35	1.04	0.71 – 1.51	0.8	0.50 – 1.25
<b>SM</b>	<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>
Predictor						
<b>ID-level</b>						
Measurement	0.58	0.24 – 1.11	0.4	0.06 – 0.92	0.41	0.09 – 0.67
Allele ( <i>Pan<sup>AA</sup></i> )	0.60	-0.14 – 1.34	-0.32	-0.40 – 1.01	0.27	-0.45 – 0.96
SGR	0.19	-0.09 – 0.48	-0.09	-0.36 – 0.18	-0.05	-0.32 – 0.24
Trial	0.18	-0.13 – 0.51	0.02	-0.36 – 0.39	0.07	-0.30 – 0.43
Object/Mirror order	0.31	-0.14 – 0.74	-0.21	-0.69 – 0.28	-0.11	-0.57 – 0.36
Shelter leave			0.17	-0.38 – 0.71	0.46	-0.08 – 1.03
<b>Residual-level</b>						
Measurement	0.46	0.29 – 0.78	0.69	0.44 – 1.13	0.65	0.42 – 1.05
<b>LA</b>	<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>
Predictor						
<b>ID-level</b>						
Measurement	0.46	0.15 – 0.96	0.20	0.00 – 0.71	0.09	0.00 – 0.50
Allele ( <i>Pan<sup>AA</sup></i> )	0.70	0.02 – 1.39	0.29	-0.35 – 0.92	0.24	-0.36 – 0.82
SGR	0.27	-0.01 – 0.55	-0.25	-0.51 – 0.02	-0.02	-0.26 – 0.23
Trial	-0.05	-0.38 – 0.27	-0.15	-0.57 – 0.24	-0.61	-1.02 – -0.19
Object/Mirror order	0.24	-0.18 – 0.65	-0.05	-0.53 – 0.42	0.46	-0.02 – 0.94
Shelter leave			-0.26	-0.77 – 0.25	0.19	-0.30 – 0.68
<b>Residual-level</b>						
Measurement	0.51	0.32 – 0.87	0.83	0.53 – 1.28	0.84	0.55 – 1.26
<b>LB</b>	<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>	<i>Median</i>	<i>UI 95%</i>
Predictor						
<b>ID-level</b>						
Measurement	0.36	0.02 – 0.83	0.02	0.00 – 0.20	0.32	0.00 – 0.91
Allele ( <i>Pan<sup>AA</sup></i> )	0.56	-0.09 – 1.22	0.17	-0.41 – 0.74	0.23	-0.44 – 0.89
SGR	0.21	-0.05 – 0.48	-0.20	-0.44 – 0.05	-0.10	-0.38 – 0.18
Trial	-0.01	-0.43 – 0.40	-0.09	-0.57 – 0.39	-0.43	-0.86 – 0.00
Object/Mirror order	0.21	-0.26 – 0.71	-0.22	-0.76 – 0.29	-0.06	-0.56 – 0.43
Shelter leave			0.38	-0.11 – 0.88	0.36	-0.21 – 0.89
<b>Residual-level</b>						
Measurement	0.64	0.40 – 1.10	1.01	0.72 – 1.44	0.7	0.41 – 1.20

<b>SJ</b>		<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	Predictor	Median	UI 95%	Median	UI 95%	Median	UI 95%
<b>NOT</b>	ID	-0.05	-0.31 – 0.11				
	Residual	0.00	-0.16 – 0.15				
<b>MT</b>	ID	0.04	-0.16 – 0.33	0.00	-0.11 – 0.16		
	Residual	0.08	-0.06 – 0.24	-0.22	-0.50 – 0.03		
<b>SM</b>		<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	Predictor	Median	UI 95%	Median	UI 95%	Median	UI 95%
<b>NOT</b>	ID	-0.13	-0.46 – 0.11				
	Residual	-0.10	-0.32 – 0.07				
<b>MT</b>	ID	-0.12	-0.41 – 0.14	0.22	-0.01 – 0.52		
	Residual	0.13	-0.04 – 0.34	-0.08	-0.29 – 0.16		
<b>LA</b>		<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	Predictor	Median	UI 95%	Median	UI 95%	Median	UI 95%
<b>NOT</b>	ID	0.01	-0.22 – 0.22				
	Residual	-0.24	-0.49 – -0.04				
<b>MT</b>	ID	-0.01	-0.20 – 0.18	0.02	-0.09 – 0.23		
	Residual	0.06	-0.14 – 0.28	-0.07	-0.32 – 0.17		
<b>LB</b>		<b>OFT</b>		<b>NOT</b>		<b>MT</b>	
	Predictor	Median	UI 95%	Median	UI 95%	Median	UI 95%
<b>NOT</b>	ID	0.00	-0.13 – 0.12				
	Residual	-0.18	-0.42 – 0.04				
<b>MT</b>	ID	0.05	-0.15 – 0.35	0.01	-0.07 – 0.19		
	Residual	0.08	-0.13 – 0.34	0.04	-0.19 – 0.28		



