

# Genetic parameters of personality traits in dogs based on behavioral assessment and questionnaire information

Erling Strandberg, Katja Nilsson and Kenth Svartberg

Dept of Animal Biosciences, SLU, Uppsala, Sweden

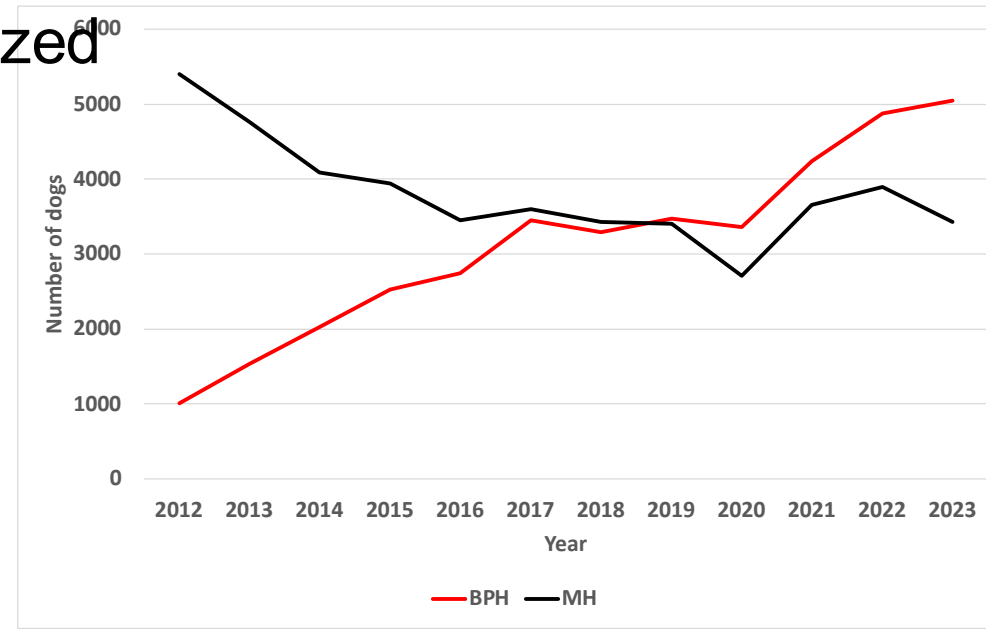
# Recording of behavior in dogs

- Long tradition of measuring behavior in Sweden
- **Dog Mentality Assessment** (DMA, MH in Swedish) started in 1989, amended in 1997, about 130,000 dogs from 1997
- Developed from a test of military dogs
- Aimed at working dog breeds, age 1 year or older
- Has become very popular also in many other breeds



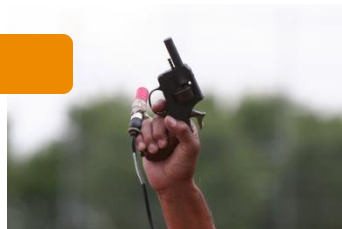
# Recording of behavior in dogs

- New behavioral description started in 2012, Behavior and Personality Assessment in Dogs, Swedish acronym **BPH**.
- **Why?**
  - DMA/MH became **too** popular, not enough test occasions
  - The idea behind BPH is that it should suit all breeds
- Similar setup as for DMA, with several standardized subtests
- About 5000 dogs described per year now
- In total, over 42,000 dogs



# BPH: carried out by the Swedish Kennel Club

8. Gunshot



1. Unknown person



7. Uneven surface



2. Play with toy



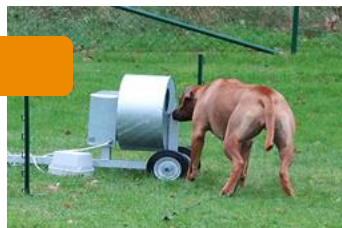
6. Approaching person



3. Food interest



5. Noise



4. Surprise



# BPH behavior traits

- Over 200 potential scores
- Hierarchical factor analysis to summarize into fewer variables: personality traits







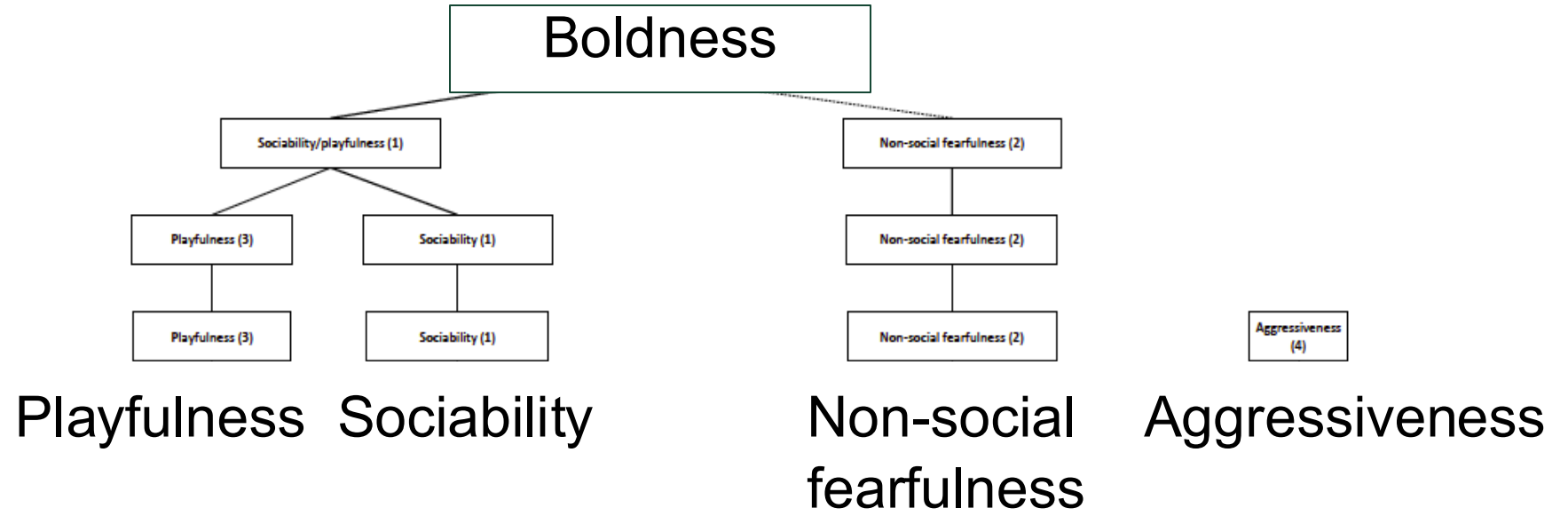
Factor  
level

1

2

3

4



# Is what we measure...





...what we want to improve?

Everyday behavior





# Questionnaire to owners (based on C-BARQ)

- 132 behavior-related questions,
- describing situations dogs might encounter in everyday life
- describe the dog's typical behavior in the recent past
- frequency or intensity of the behavior, 1-5
- Currently about 20,000 answers from all kinds of breeds
- 20 behavior traits defined
  - 4 related to interest in people or dogs
  - 3 related to aggression towards people or dogs
  - 5 related to fear of people, dogs or situations
  - 2 both aggression and fear
  - various other behaviors



- Estimate heritability and genetic correlations for personality traits based on BPH and questionnaire data for 8 breeds
- Especially the genetic correlations between BPH and questionnaire traits

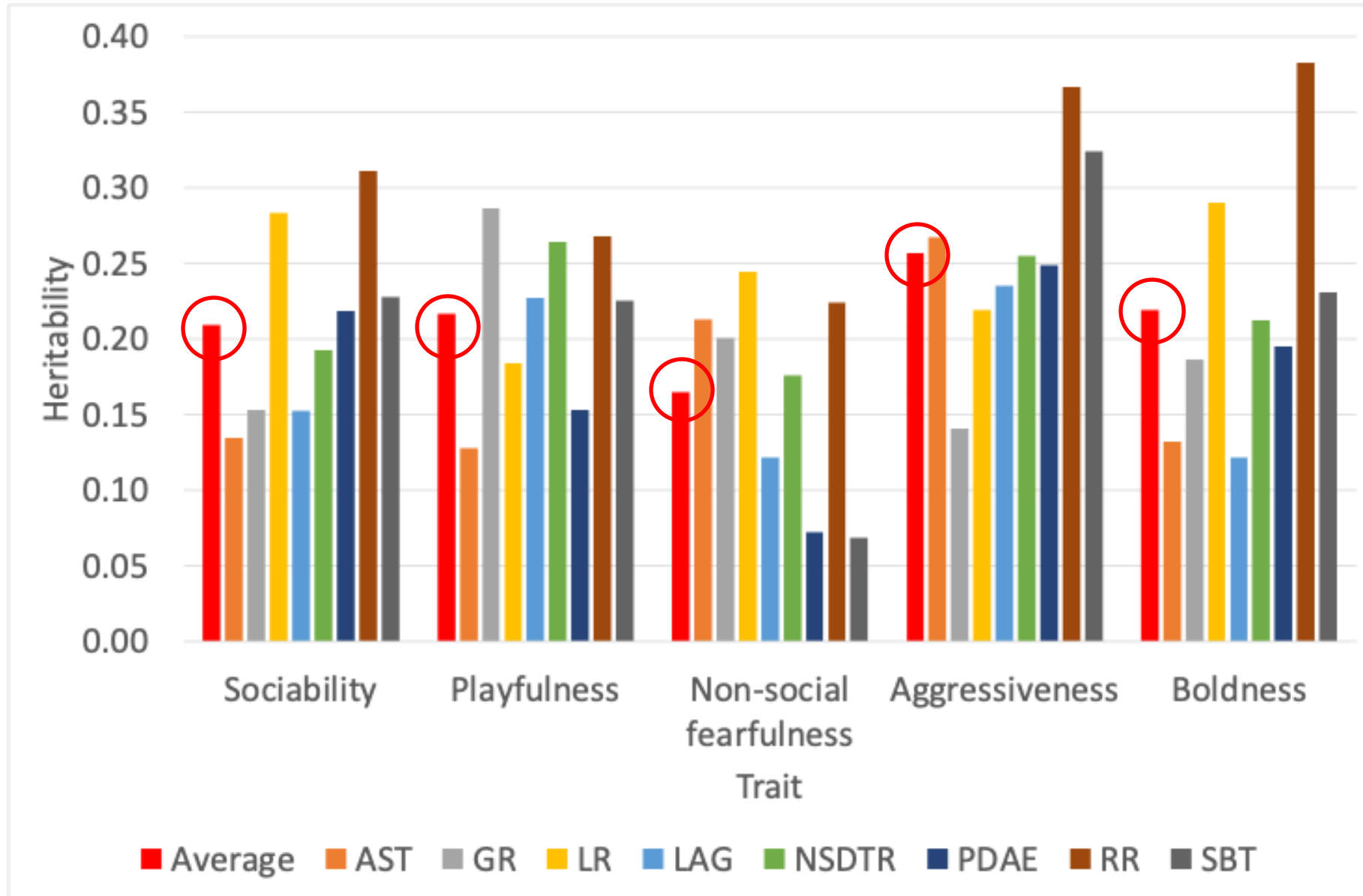


# Data 8 breeds

Breed	Acronym	N BPH	N Questionnaire
American Staffordshire Terrier	AST	878	286
Golden Retriever	GR	1535	839
Labrador Retriever	LAB	2461	630
Lagotto Romagnolo	LAG	860	527
Nova Scotia Duck Tolling Retriever	NSDTR	1497	516
Perro de Agua Español	PDAE	982	209
Rhodesian Ridgeback	RR	1938	652
Staffordshire Bull Terrier	SBT	1699	303



# Heritabilities BPH



# Average genetic correlations BPH-traits

	Playfulness	Non-social fearfulness	Aggressiveness	Boldness
Sociability	0.31	-0.24	-0.28	0.77
Playfulness		-0.19	-0.11	0.64
Non-social fearfulness			0.16	-0.57
Aggressiveness				-0.28

- Genetically, more social and playful dogs show less non-social fearfulness and aggressiveness, and more boldness.
- More fearful dogs show more aggressiveness and less boldness



# Heritabilities questionnaire traits

- Much more variable than for BPH
- Smaller data sets
- For several breed x trait combinations analyses did not converge (ended up at 0 or 1.0)
- Average 0.37 (SD 0.26)



# Genetic correlations between BPH traits and everyday behavior traits



# Genetic correlation BPH-questionnaire (5 breeds)

	BPH trait				
Questionnaire trait	Sociability	Playfulness	Non-social fearfulness	Aggressiveness	Boldness
Dog-directed interest	0.58	0.35	-0.16	-0.28	0.55
Stranger-directed interest	0.93	0.29	-0.06	-0.27	0.78
Human-directed play interest	0.37	0.77	-0.12	0.02	0.55
Trainability	0.16	0.48	-0.28	-0.14	0.31
Dog rivalry	-0.56	0.22	0.07	0.32	-0.13
Stranger-directed aggression	-0.65	-0.38	0.06	0.57	-0.62
Owner-directed aggression	-0.14	-0.17	-0.18	-0.14	-0.10
Dog-directed aggression or fear	-0.55	-0.31	0.10	0.36	-0.58
Stranger-directed fear	-0.89	-0.47	0.25	0.47	-0.80
Non-social fear	-0.47	-0.27	0.77	0.22	-0.71
Attachment and attention seeking	-0.12	-0.11	-0.27	0.11	0.00
Separation related behavior	0.08	-0.21	-0.03	-0.02	-0.11
Excitability	0.06	-0.08	-0.16	0.24	-0.07
Energy level	0.51	0.52	-0.29	0.27	0.55
Chasing	0.04	0.20	-0.03	0.35	0.06
Touch sensitivity	-0.38	-0.10	0.36	0.21	-0.58
Situational fear	-0.48	-0.19	0.88	0.50	-0.76
Social fear and aggression	-0.81	-0.45	0.38	0.51	-0.71
Fear recovery latency	-0.53	-0.22	0.80	0.06	-0.82
Stubborn and curious	0.19	0.33	-0.44	0.17	0.53

always positive

always negative

# Conclusions

- BPH-traits have generally reasonable heritability, around 0.2 (range 0.07-0.38)
- Questionnaire traits also, on average, reasonable heritability but much more variable, some “bad” traits
- Genetic correlations between BPH and questionnaire traits “make sense”
  - Similar traits are logically correlated, e.g., Sociability, Fearfulness, and Aggressiveness
  - Dog-human interaction traits at BPH were related to dog-dog interactions in everyday situations, e.g., Sociability and Dog-directed aggression or fear