The Origins of Attitudes
Genetic Bases and Acquisition

Course: Attitudes and social judgement

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I. The Heritability of Attitudes

How do genes influence behavior and especially attitudes?

nature and **nurture**

1. Introduction

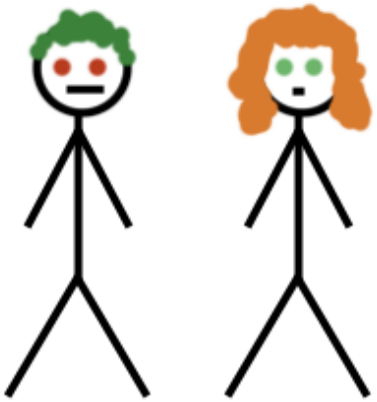
• common view: attitudes are environmentally caused

• heredity and environment are closely linked

• impossible to determine the extent of the genetical cause

Twin studies

DZ Twins

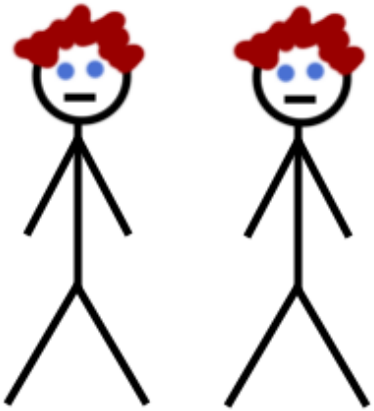


Different DNA
Same Environment

If inteligence is the **same** it must be due to the **environment.**

If inteligence is **different** it must be due to **genetics.**

MZ Twins



Same DNA
Different Environment

If inteligence is the **same** it must be due to **genetics.**

If inteligence is **different** it must be due to the **environment.**

2. A Study of Twins

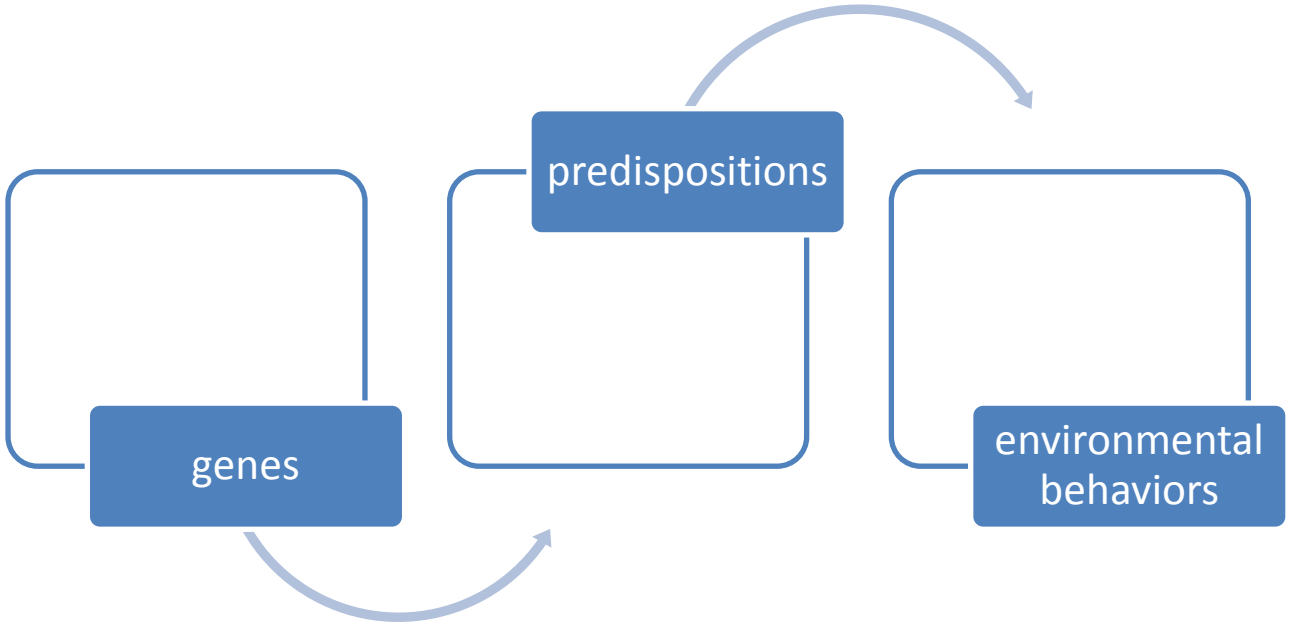
- James M. Olson, Philip A. Venon, Julie Harris and Kerry L. Jang

Goals:

- Confirm past findings
- Explore mediators of genetic effects
- Examine thesis of Tesser (1993)

– If attitudes are heritable it is more difficult to change them

Assumption



- forming an attitude / like or dislike

Procedure

- 195 monozygotic, 141 dizygotic pairs of twins
- questionnaire with 30 targets (scale -3 to 3)
- 2 additional questions for each target:
    1. How important is this attitude to you?
    2. How strongly do you hold this attitude?
- Self-rating on 20 personality skills
- also took unshared and shared environmental factors into account

Results

- 26 of 30 attitudes yielded high heritability coefficients
- identified 9 attitude factors – 6 of them yielded high heritability coefficients
- No one to one connection: gene-attitude

  but apart from learning

  attitudes depend on biological factors

Table 1
Genetic Analyses of Individual Attitude Items

Attitude	Correlations		Best fitting model		Estimates			
	MZ	DZ	Model	Fit	a^2	c^2	e^2	d^2
Doing crossword puzzles	.46	.11	ADE	$\chi^2(3) = 1.47$, *ns*	.02		.55	.43
Death penalty for murder	.45	.33	AE	$\chi^2(4) = 5.61$, *ns*	.50	.00	.50	
Sweets	.36	.23	ACE	$\chi^2(3) = 1.41$, *ns*	.22	.12	.65	
Open-door immigration	.47	.20	AE	$\chi^2(4) = 2.18$, *ns*	.46		.54	.00
Doing athletic activities	.41	.26	AE	$\chi^2(4) = 2.18$, *ns*	.44	.00	.56	
Voluntary euthanasia	.45	.21	AE	$\chi^2(4) = 2.29$, *ns*	.44		.56	.00
Smoking	.49	.38	ACE	$\chi^2(3) = 2.51$, *ns*	.31	.21	.48	
Being the center of attention	.31	.14	AE	$\chi^2(4) = 5.52$, *ns*	.28		.71	.00
Separate roles for men and women	.27	.26	CE	$\chi^2(4) = 2.54$, *ns*	.00	.26	.74	
Education	.30	.14	AE	$\chi^2(4) = 11.64$, $p < .02$	.32		.68	.00
Making racial discrimination illegal	.37	−.01	ADE	$\chi^2(3) = 4.71$, *ns*	.00		.66	.34
Loud music	.53	.49	ACE	$\chi^2(3) = 1.15$, *ns*	.11	.43	.46	
Getting along well with other people	.20	.19	AE	$\chi^2(4) = 19.61$, $p < .001$	.28	.00	.72	
Capitalism	.41	.19	AE	$\chi^2(4) = 4.67$, *ns*	.39		.61	.00
Playing organized sports	.52	.10	ADE	$\chi^2(3) = 0.46$, *ns*	.00		.48	.52
Big parties	.44	.30	ACE	$\chi^2(3) = 2.14$, *ns*	.32	.13	.54	
Playing chess	.38	.22	AE	$\chi^2(4) = 2.76$, *ns*	.38	.00	.62	
Looking my best at all times	.42	.14	ADE	$\chi^2(3) = 3.13$, *ns*	.10		.55	.35
Abortion on demand	.53	.28	AE	$\chi^2(4) = 1.00$, *ns*	.54	.00	.46	
Public speaking	.34	.26	ACE	$\chi^2(3) = 1.91$, *ns*	.20	.15	.65	
Playing bingo	.37	.33	CE	$\chi^2(4) = 7.07$, *ns*	.00	.33	.65	
Wearing clothes that draw attention	.38	.28	ACE	$\chi^2(3) = 2.39$, *ns*	.24	.15	.61	
Easy access to birth control	.24	.27	CE	$\chi^2(4) = 5.35$, *ns*	.00	.25	.75	
Exercising	.35	.17	AE	$\chi^2(4) = 2.77$, *ns*	.36		.64	.00
Organized religion	.43	.21	AE	$\chi^2(4) = 3.17$, *ns*	.45		.55	.00
Being the leader of groups	.40	.08	ADE	$\chi^2(3) = 2.13$, *ns*	.00		.59	.41
Reading books	.55	.24	ADE	$\chi^2(3) = 4.31$, *ns*	.37		.43	.20
Castration as punishment for sex crimes	.39	.29	ACE	$\chi^2(3) = 0.48$, *ns*	.17	.21	.62	
Being assertive	.28	.27	CE	$\chi^2(4) = 4.00$, *ns*	.00	.28	.72	
Roller coaster rides	.50	.31	AE	$\chi^2(4) = 2.82$, *ns*	.52	.00	.48	

Note. Estimates of .00 mean that the component was tested but did not account for a significant amount of variance. MZ = monozygotic twins; DZ = dizygotic twins; A (a^2) = additive genetic variance; E (e^2) = nonshared environmental variance; D (d^2) = nonadditive genetic variance; C (c^2) = shared environmental variance.

additive and nonadditive genetic effects form heritability coefficients

Table 3
Factor Analysis of Individual Attitude Items

Attitude	Factor 1	2	3	4	5	6	7	8	9
Doing crossword puzzles	−.01	−.11	−.06	.05	**.55**	−.05	−.03	.16	**.44**
Death penalty for murder	.07	−.06	.04	−.01	−.11	−.17	.06	**.74**	.06
Sweets	.11	.01	.09	−.13	−.04	.11	.08	−.08	**.73**
Open-door immigration	−.20	.15	−.16	.03	−.07	**.46**	−.13	−.33	.20
Doing athletic activities	**.85**	.08	.05	.11	.05	−.05	.05	−.03	.03
Voluntary euthanasia	.01	.08	**.71**	−.03	.06	.15	−.06	.21	.11
Smoking	−.35	−.03	.11	**.57**	.09	−.10	−.01	.24	−.09
Being the center of attention	−.01	**.72**	.01	.15	−.12	−.08	.15	−.04	.16
Separate roles for men and women	.03	.05	−.25	−.05	−.03	**−.56**	−.01	.14	.08
Education	.17	−.10	−.07	−.17	**.44**	.37	.30	.05	−.06
Making racial discrimination illegal	−.02	.07	.00	−.01	.05	**.73**	−.02	.04	.08
Loud music	.12	.02	.02	**.78**	−.12	.04	.04	−.10	−.04
Getting along well with other people	.22	.05	.00	−.02	−.05	**.40**	**.44**	.17	.02
Capitalism	.03	.08	−.09	−.01	**.48**	−.29	.29	.06	−.21
Playing organized sports	**.68**	.06	−.06	.21	.13	−.03	−.02	.20	.15
Big parties	.21	.32	.10	**.46**	−.10	.06	.34	−.03	.06
Playing chess	.08	.22	.08	−.06	**.55**	−.06	−.15	−.13	.04
Looking my best at all times	.06	.02	−.03	−.04	−.01	−.08	**.79**	.11	.02
Abortion on demand	.02	.05	**.73**	.08	.13	−.09	.05	−.06	.15
Public speaking	.14	**.58**	−.10	.03	.30	.12	−.10	−.01	−.12
Playing bingo	−.12	−.10	.04	.36	.13	−.04	.06	.29	**.43**
Wearing clothes that draw attention	−.08	.38	.10	.21	−.15	−.05	**.50**	−.12	.26
Easy access to birth control	−.01	−.06	**.62**	.10	.07	.28	.26	−.06	−.07
Exercising	**.79**	.13	.04	−.04	.00	.01	.12	−.04	−.11
Organized religion	−.02	−.01	**−.62**	−.12	.23	.07	.19	.00	.11
Being the leader of groups	.12	**.81**	.02	.00	.09	.00	−.04	.05	−.02
Reading books	−.01	.05	.10	−.12	**.62**	.21	−.09	−.15	−.01
Castration as punishment for sex crimes	.00	.08	.00	−.02	−.03	.06	.05	**.74**	−.03
Being assertive	.09	**.52**	.17	−.13	.10	.11	.19	.03	−.25
Roller coaster rides	.22	.04	.09	**.52**	−.10	.03	−.09	−.05	.02

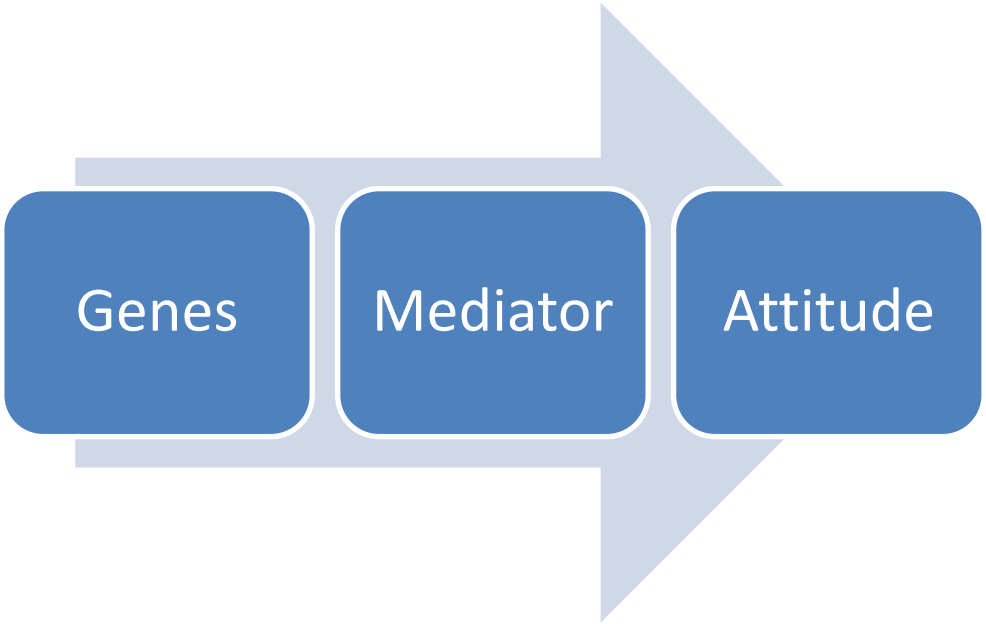
Note. Loadings greater than .40 are presented in boldface.

1 : Attitudes toward Athletics
2: Leadership
3: Preservation of Life
4: Sensory Experiences
5: Intellectual Pursuits
6: Equality
7: Outward Appearance
8: Treatment of Criminals
9: Sweets and Games

Table 9
Genetic and Environmental Correlations Between Attitudes and Potential Mediators

Attitudes factor and mediator	h^2	Genetic correlation	Environmental correlation
Athleticism	.54		
Aggressiveness	.43	−.03	.06
Sociability	.47	.03	.19
Persistence	.38	**.25**	.11
Athleticism	.61	**.63**	**.30**
Attractiveness	.54	.10	.09
Academic ach.	.56	.17	.04
Leadership	.41		
Aggressiveness	.43	**.41**	**.37**
Sociability	.47	**.43**	.02
Persistence	.38	**.26**	.09
Athleticism	.61	.10	.15
Attractiveness	.54	**.55**	.01
Academic ach.	.56	**.22**	−.03
Preservation of Life	.66		
Aggressiveness	.43	−.13	.10
Sociability	.47	**.21**	−.10
Persistence	.38	.11	.03
Athleticism	.61	.05	.05
Attractiveness	.54	**.22**	−.02
Academic ach.	.56	−.04	.00
Sensory Experiences	.36		
Aggressiveness	.43	**.33**	.08
Sociability	.47	**.41**	.07
Persistence	.38	**−.28**	.14
Athleticism	.61	**.28**	**.20**
Attractiveness	.54	.14	.07
Academic ach.	.56	−.05	−.13
Equality	.55		
Aggressiveness	.43	−.19	−.17
Sociability	.47	**.44**	−.01
Persistence	.38	.17	.04
Athleticism	.61	.00	−.06
Attractiveness	.54	.11	−.08
Academic ach.	.56	**.24**	**−.24**
Outward Appearance	.45		
Aggressiveness	.43	.01	.04
Sociability	.47	**.36**	**.34**
Persistence	.38	−.11	.03
Athleticism	.61	−.09	.08
Attractiveness	.54	**.27**	**.21**
Academic ach.	.56	−.04	.06

Note. Correlations presented in boldface are significant at $p < .005$ (two tailed). h^2 = heritability coefficients; ach. = achievement.



Largest heritability components (greater or equal .50)

- Attitudes toward reading books
- abortion on demand
- playing organized sports
- rollercoaster rides
- the death penalty for murder

- **Personality items**: humble, ambitious, exhibitionistic, aesthetic, friendly

Smallest genetic components:

- attitudes toward roles for men and women
- playing bingo
- easy access to birth control
- being assertive

- **personality items:** neat, obliging, inconsistent

3. Interpretation and Discussion

- generally consistent with past studies

- covered new attitude topics

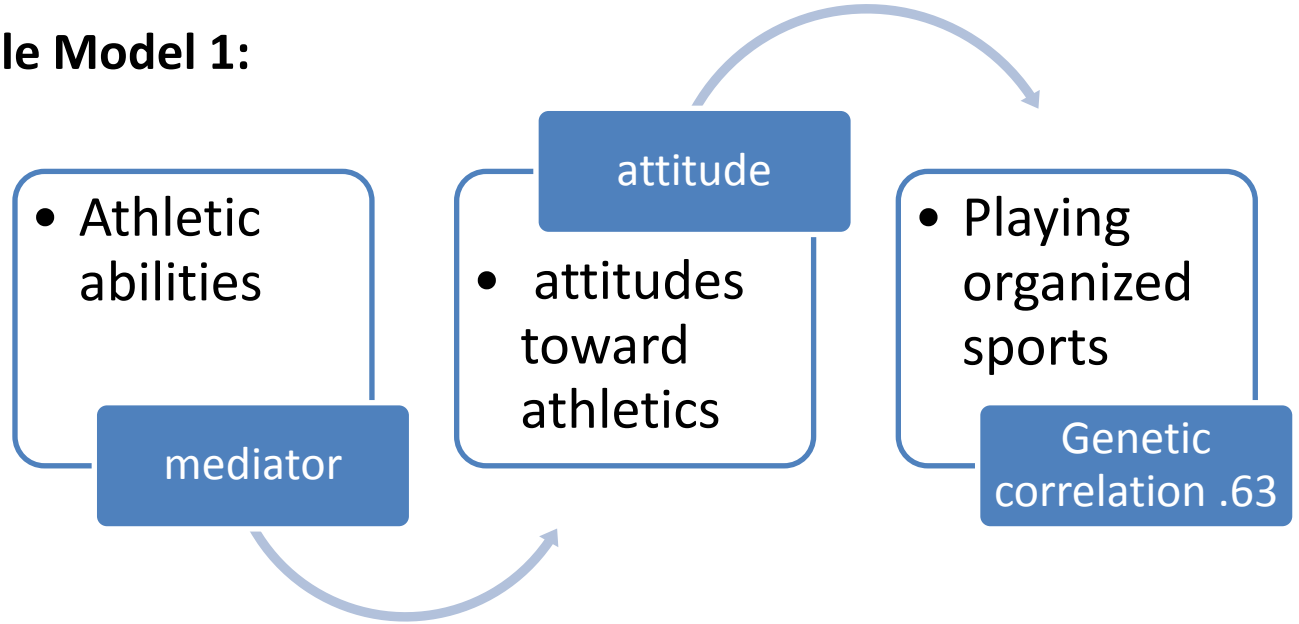
- only few attitude topics yielded heritability estimates close to zero

→ differences between individuals' attitudes are genetically determined

- several potential mediators were identified

- 2 models: *mediator causes attitude* versus the *attitude causes mediator*

Example Model 1:



- results support Tesser's hypothesis (1993):

  – mean important and mean strength scores were strongly related to heritabilities of attitude factors

  – highly heritable attitudes are held stronger

  – biological basis may make change more difficult

- 35 % of attitudinal variance was due to genetics

- largest number of variances in attitudes was caused by nonshared environmental factors (individual experiences of twins)

→ **Nature** and **Nurture**

II. Evaluative Conditioning and the Spreading Attitude Effect

A Study of Eva Walther

University of Heidelberg

1. Terms of conditioning

- Neutral stimulus (NS) causes an unspecific reaction
- Unconditioned stimulus (US) automatically triggers a response
- Conditioned stimulus (CS) is an originally neutral stimulus that, after becoming connected with an US, causes a conditioned response

2. Classical and Evaluative Conditioning

Classical Conditioning

- Training NS+US→ unconditioned response

  Result NS=CS→ conditioned response
- Consious if-then relationship between US and CS
- Strict contingency rarely occurs in reality

Evaluative Conditioning

- An unconscious „transfer of value“ (Hammerl& Grabitz, 1996)
- CS acquires the attributes of the US
- No personal experience and awareness necessary

3. The Spreading Attitude Effect

A phenomenom of Evaluative Conditioning

Assumptions

Affective evaluation spreads to objects that are preassociated with the CS

→ Associative chain

→ No direct link

→ Unconscious mechanism

The Study

- 5 experiments
- Participants rated on a graphic rating scale pictures of white male faces
- Computer categorised neutral rated photos as NS and most liked ones as US

Preconditioning phase:

- Presentation of pairs of neutral stimuli

  Difference:

- Experimental group: N1 paired with N2

  N4 paired with N5

- Control group: N1 paired with N3

  N4 paired with N5

Conditioning phase:

Both groups: N2-US pairings

N5-N6 pairings

Test phase:

- Participants judged visual stimuli again
- Open ended test to check awareness

Results

- Conditioning phase:

  Both groups rated N2 more positively than N5

→ Connecting N2 with an CS caused a shift of evaluation

- Preconditioned phase:

  Experimental group rated N1 more positively than N4

→ Preassociation of N1 with N2 resulted in a change of evaluation

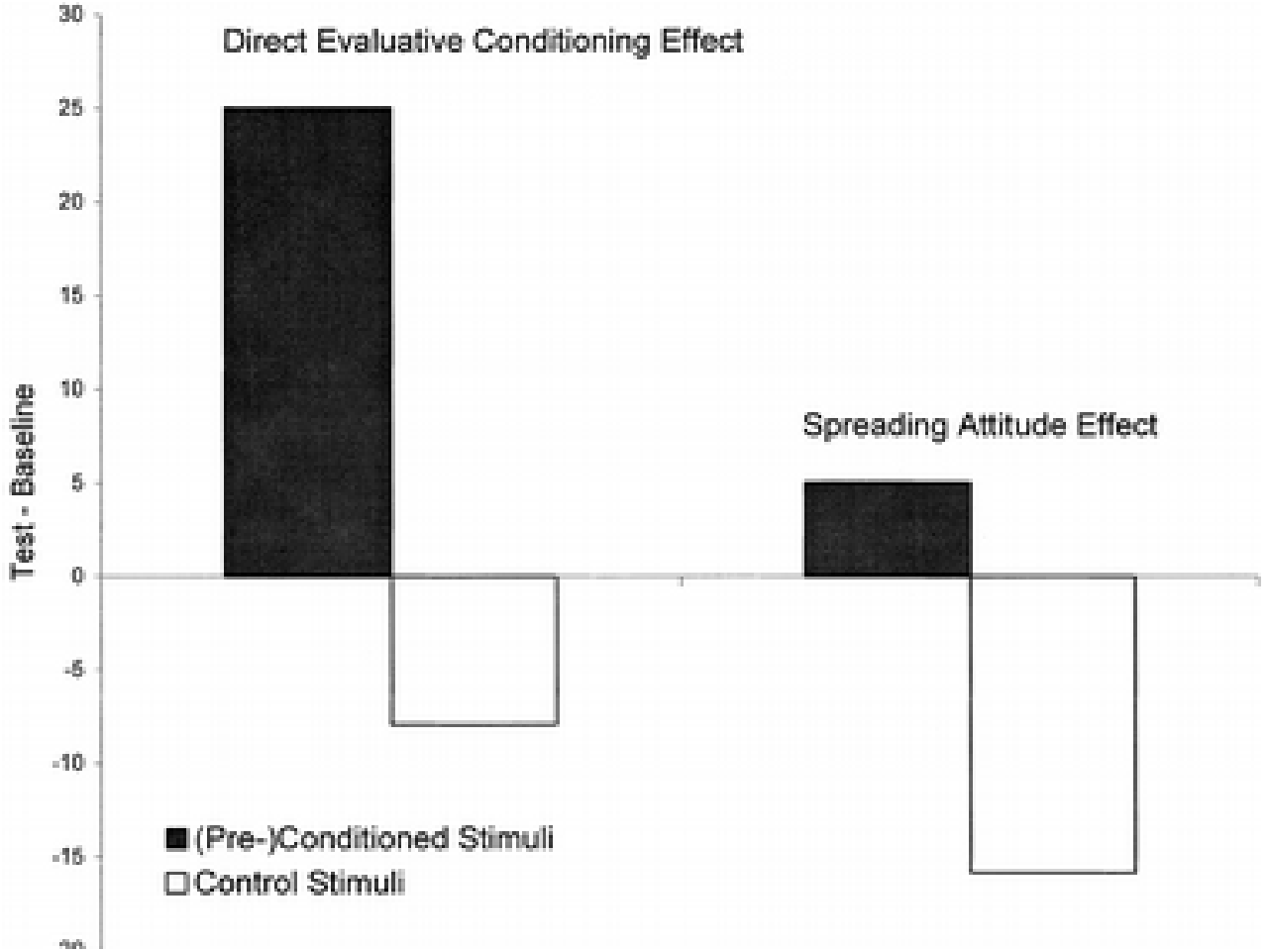


Figure 1

Study 1. Direct evaluative conditioning effect and spreading attitude effect in an appetitive evaluative conditioning paradigm.

- Second experiment: NS combined with an negative stimuli
- Third experiment: extinction phase inserted
- Fourth experiment: conditioning and preconditioning phases reversed
- Fifth experiment: load manipulation

4. Interpretation

- A liked or disliked US does not only affect the evaluation of the CS, but also other objects preassociated with it.

  This is called the spreading attitude effect.
- The effect also works forward.
- It is resistant to extinction.
- It doesn t depend on mental resources and awareness.

Formation of attitudes is not dependent on the direct experience but can work through associative chains.

→Consumer research

→Treatment of phobias

III. Conclusion

- Genes influence the forming of attitudes via special mediators
- Attitudes with a genetic basis are held stronger
- Attitudes are also formed by (often) unconscious associative chains.
- Impossible to untangle nature and nurture

References

- James M. Olson, Philip A. Venon, Julie Atiken Harris, Kerry L. Jang (2001). The Heritability of Attitudes: A Study of Twins, *Journal of Personality and Social Psychology* , *80, 845-860.*
- Walther, Eva (2002). Guilty by Mere Association: Evaluative Conditioning and the Spreading Attitude Effect, *Journal of Personality and Social Psychology, 82, 919-934.*
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