Evolutionary psychiatry

Health and mental health

Why do we get sick?

- **Polygenic traits (extremes of normal variation)**

- Trade-offs

- Conflicts

- **Defenses - adaptations**

- smoke-detector theory

- novel environments

Polygenic traits

- Some mental health susceptibility may be:

  - extremes of adaptive emotional responses

  - extremes of adaptive personality variation

Examples ?

Polygenic traits

- Some mental health susceptibility may be:
  - extremes of adaptive emotional responses
  - extremes of adaptive personality variation

- Examples:
  - fear → phobia
  - selfishness, egotism → psychopathy
  - sadness → depression

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Schizophrenia

Schizophrenia is puzzling:

- strongly negative fitness - incr. mortality, reduced fertility, esp. males
- high heritability (ca. 70%) - many genes with small effects
- Genes associated with schizophrenia under positive selection*
- About 1% across cultures

How is it maintained in the population?

*Crespi et al. *Proc R Soc. B*. 2007

Schizophrenia and Schizotypy

Schizophrenia symptoms:

- hallucinations, delusions
- apathy, lack of emotion
- disorganized thoughts, problems completing tasks

- Schizotypy -- viewed as a continuum of personality characteristics involving unusual experiences, disorganized thinking -- with schizophrenia at one end.

Schizophrenia:

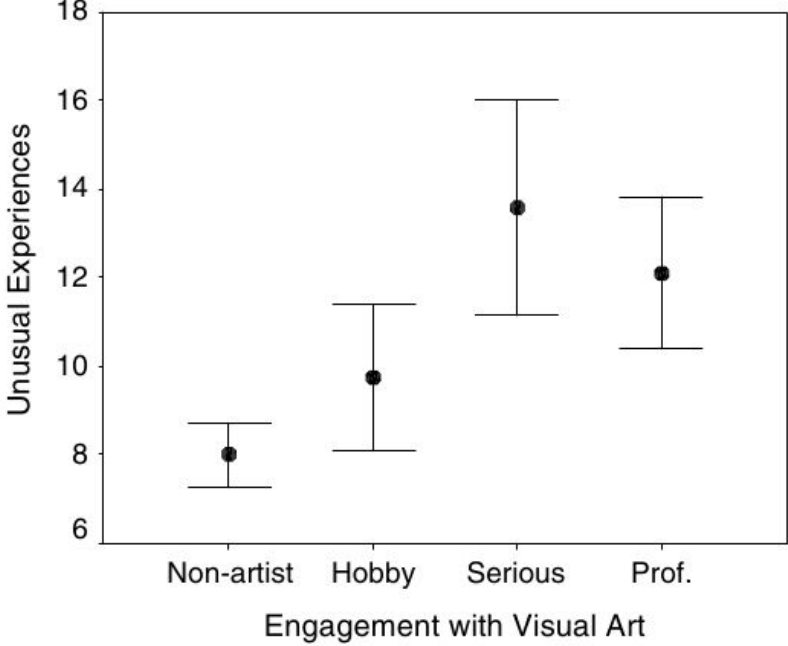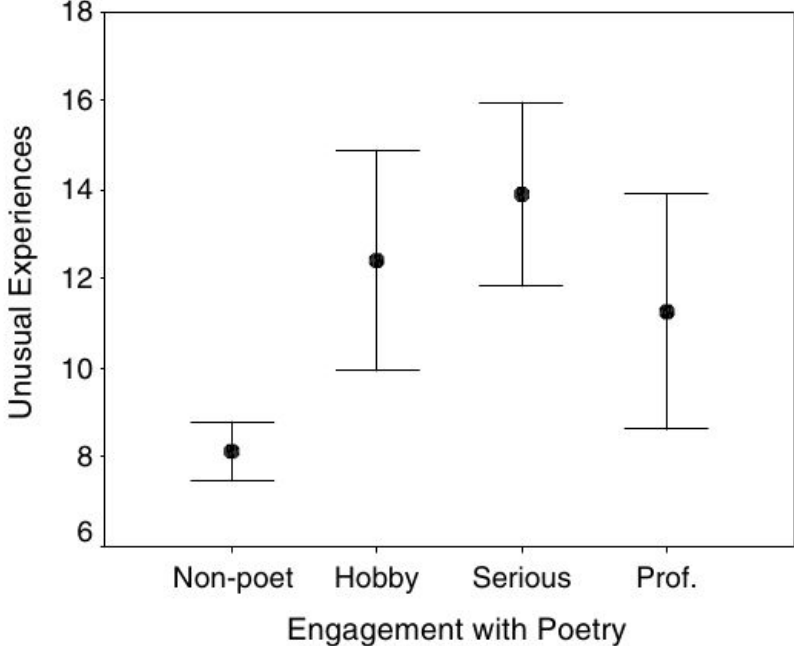Are creative people prone to schizotypy?

Score higher on measures of creativity; over-represented in artistic occupations

Nettle 2006:

compared poets, artists, mathematicians, controls and schizophrenia patients on schizotypy questionnaire
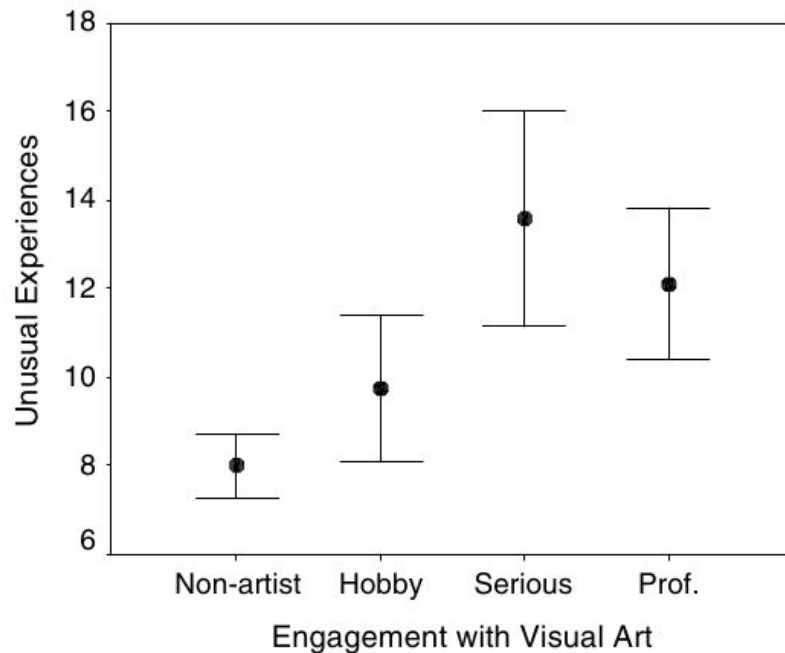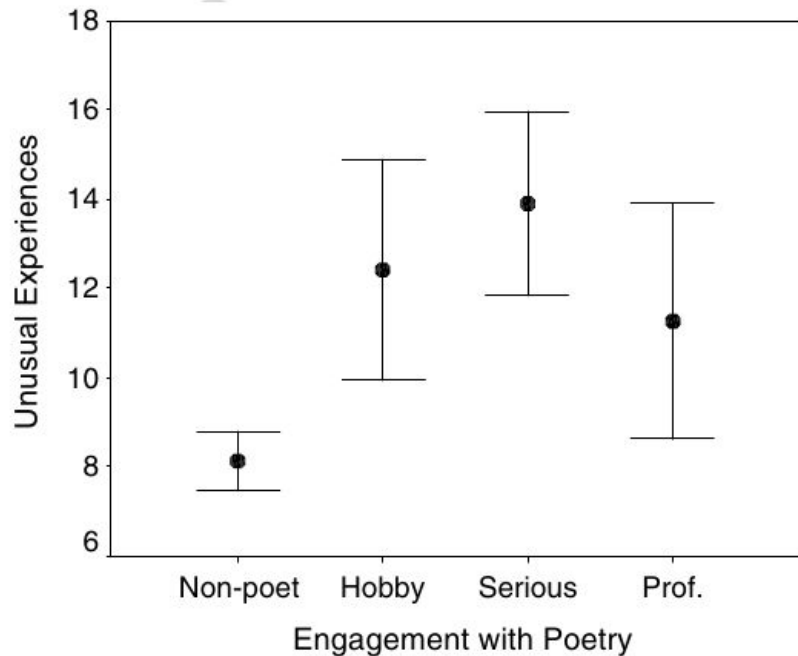
Schizotypy and creativity

Unusual experiences: hallucinatory & magical thinking, perceptual distortions

Schizotypy and creativity

Scores for poets & artists (but not mathematicians) similar to schizophrenia patients, but not associated with negative symptoms

Some have suggested that this might explain how genes for schizophrenia are maintained in the population.

But most studies say any fitness advantage in creativity (to relatives who share genes associated with schizophrenia) is not enough to outweigh the fitness costs of schizophrenia.

----Lots of theories! This is one case where evolutionary psychology needs help from genetics.

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Pathogens can affect brain & behavior

Examples:

Toxoplasmosis makes rats fearless, especially around cats! May affect human behavior also (by-product)

Rabies, etc.

Probably a greater role for infections than previously thought

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Psychopathy

- glib and superficial charm
- inflated ability of self-worth
- lack of remorse or guilt
- manipulative and deceitful
- persistent lying
- impulsive, irresponsible
- seeks stimulation
- promiscuity

(among others)

from the Hare Psychopathy Checklist-Revised

Primary Psychopathy

Psychopathy (factors):

- callous affect

- interpersonal manipulation

- erratic lifestyle

- criminal tendencies

from the Self-Report Psychopathy scale, Paulhus et al.

Psychopathy: An adaptation?

An extreme end of a personality trait (like schizotypy)

Is it adaptive? If so what for?

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EP hypothesis: social deception, cheating

"Not all psychopaths are in prison. Some are in the boardroom"

(Robert Hare, 2002 address to the Canadian Police Association).

Sub-clinical psychopathy as strategic manipulation

Gervais et al: Is it strategic?

Prediction: primary (manipulative, callous) psychopaths will defect on people who are not valuable to them.

- Value: quality of partner

- Value: likelihood of future interactions

Studied with a prisoner's dilemma game

THE PRISONER'S DILEMMA

	B stays silent (cooperates)	B betrays A (defects)
A stays silent (cooperates)	Both serve 1 year	A serves 3 years, B goes free
A betrays B (defects)	A goes free, B serves 3 years	Both serve 2 years

	Cooperate	Defect
Cooperate	R R	T S
Defect	S T	P P

T(emptation to defect) > R(eward for cooperating) > P(unishment) > S(ucker's payoff)

R > P: Mutual cooperation better than mutual defection BUT
T > R and P > S: defection dominant strategy for both players
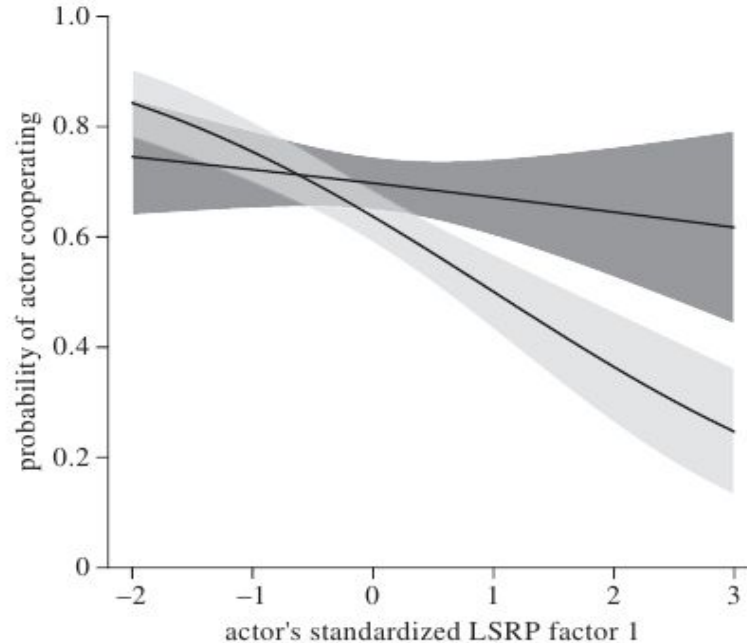
Psychopathy & strategic manipulation

Table 1. Pay-off matrix for player 1 ('actor') in each prisoner's dilemma game. Pay-offs are in US dollars.

| | | player 2 ('recipient') | |
		cooperate ('transfer')	defect ('keep')
player 1 ('actor')	cooperate ('transfer')	$6	$0
	defect ('keep')	$9	$3

Gervais et al., *Proc. Royal Soc. B.* 2013

Psychopathy & strategic manipulation

Actors higher in psychopathy were less likely to cooperate in the absence of "common ground"

Dark gray: common ground
Light gray: no common ground

Gervais et al., *Proc. Royal Soc. B.* 2013

Psychopathy & strategic manipulation

Actors higher in psychopathy were less likely to cooperate the more they were interrupted by the recipient.

Dark gray: low psychopathy
Light gray: high psychopathy

Gervais et al., *Proc. Royal Soc. B.* 2013
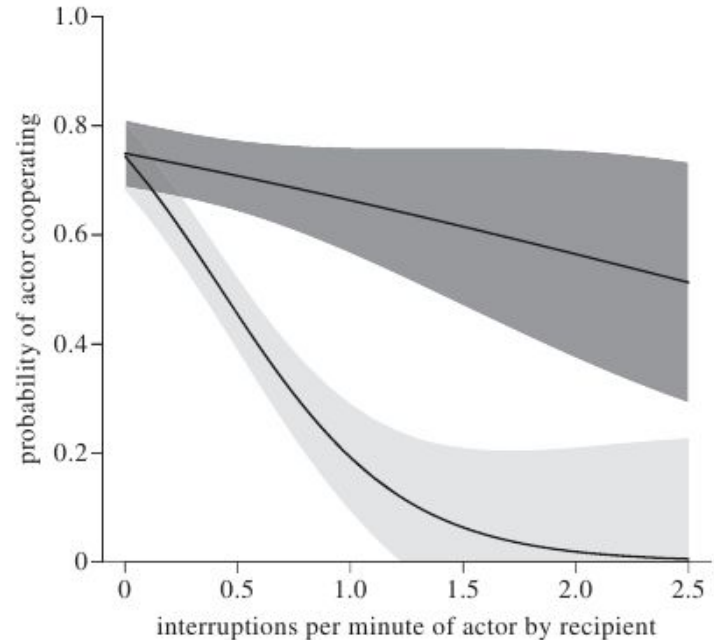
If psychopathy is adaptive, why isn't everyone a psychopath?

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Psychopathy: An adaptation?

If psychopathy is adaptive, why isn't everyone a psychopath?

EP suggests primary psychopathy favored when:

- rare (frequency-dependent selection)

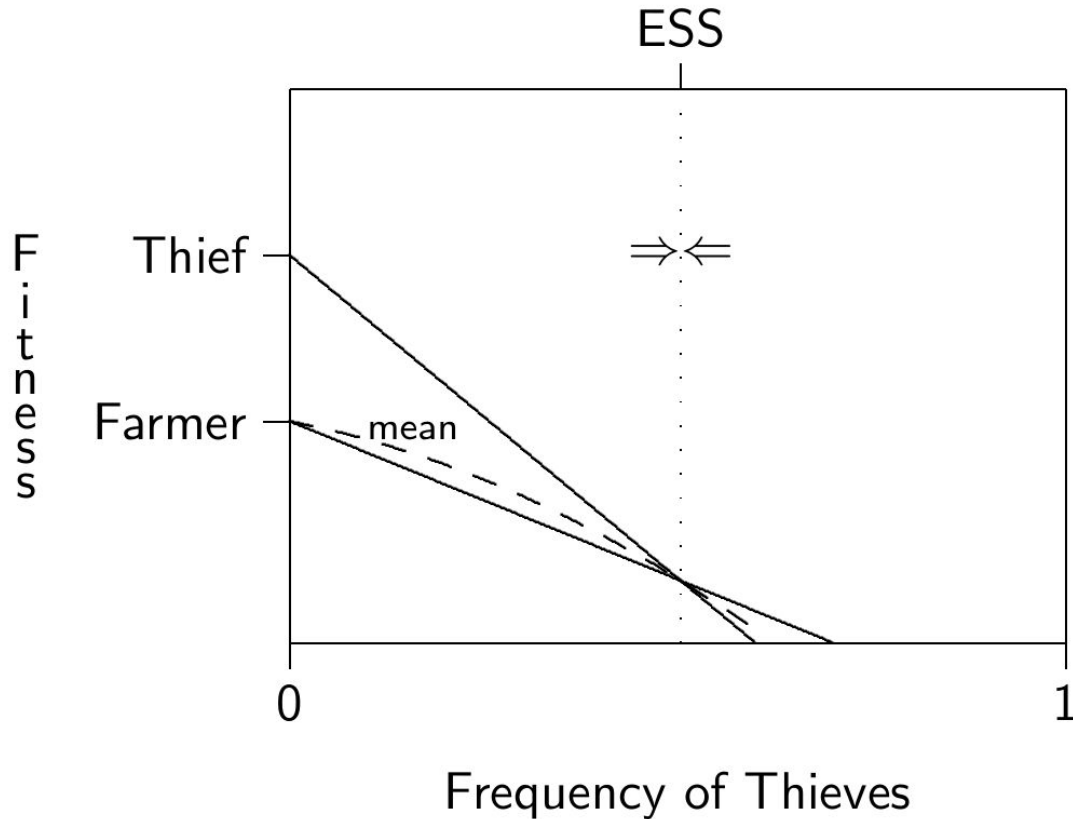- can escape sanctions (mobility, anonymity)

Psychopathy: Frequency dependence

The strategy can bring high fitness benefits when rare

But becomes less rewarding at higher frequencies:

- cheater is more likely to encounter another cheater

- population may also become more vigilant
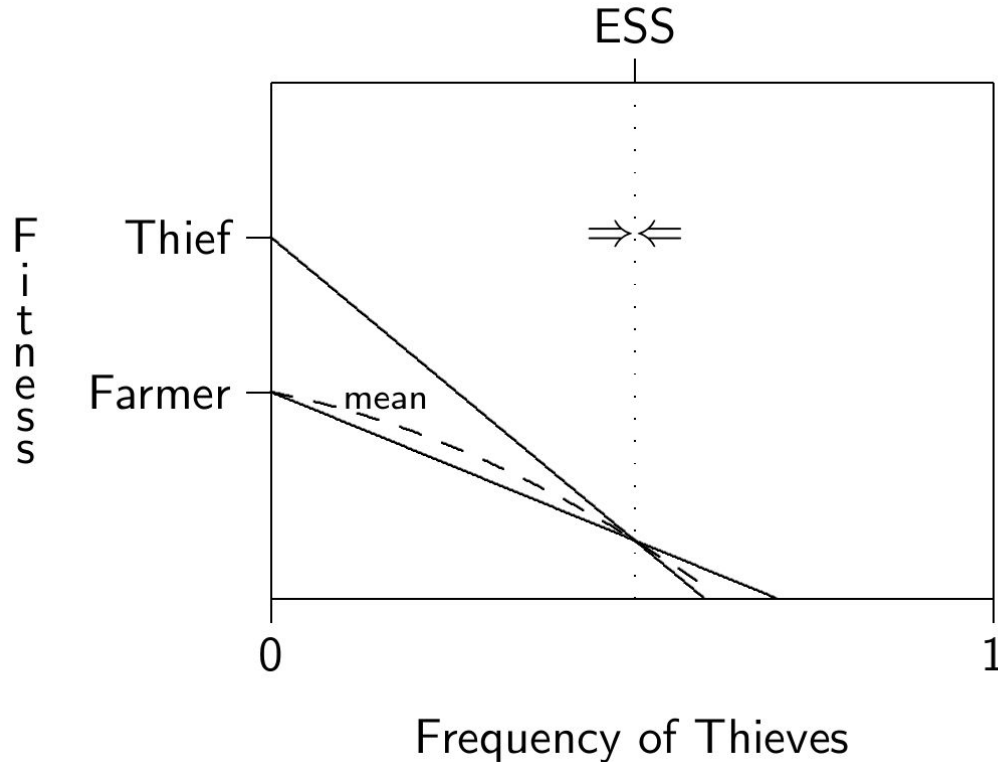
- Decreases mean fitness in population

Frequency-dependence

At LEFT:
- ▶ thieves rare
- ▶ stealing is easy
- ▶ high fitness
- ▶ freq of thieves increases

Frequency dependence

- At RIGHT:
  - thieves common
  - stealing is hard
  - freq of thieves decreases
- Lines cross at equil.
- Mean fitness decr.

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- novel environments

- smoke-detector theory

Sadness and depression: Defenses ?

Adaptive **hypotheses:**

- Caused when can't achieve goals: stop, change course ?

- Signal subordinate status ? (see cartoon). Monkeys who decline in dominance rank have lowered serotonin levels and "look like depressed people"

PEANUTS

THIS IS MY "DEPRESSED STANCE"

WHEN YOU'RE DEPRESSED, IT MAKES A LOT OF DIFFERENCE HOW YOU STAND...

THE WORST THING YOU CAN DO IS STRAIGHTEN UP AND HOLD YOUR HEAD HIGH BECAUSE THEN YOU'LL START TO FEEL BETTER..

IF YOU'RE GOING TO GET ANY JOY OUT OF BEING DEPRESSED, YOU'VE GOT TO STAND LIKE THIS..

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Sadness & depression: Novel environments

Mismatch hypothesis (**novel environments**):

Depression is correlated with economic development. Why?

Nesse: human social life today leads to many people being trapped pursuing unreachable goals.

Text: we compare ourselves to unrealistic standards due to media images and descriptions of extremely beautiful, successful people

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- **Smoke-detector theory** (anxiety): Expect false alarms when the cost of the alarm is low & the cost of an actual threat is high