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Survival of the shyest: Timidity's surprising benefits

24 April 2013 by [Lesley Evans Ogden](#)

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Timid types get a bad rap, but discoveries about animal personalities suggest we should value shy people just as much as extroverts

"DON'T be shy!" It's an oft-heard phrase in modern western cultures where go-getters and extroverts appear to have an edge and where raising confident, assertive children sits high on the priority list for many parents. Such attitudes are understandable. Timidity really does hold individuals back. "Shy people start dating later, have sex later, get married later, have children later and get promoted later," says Bernardo Carducci, director of the [Shyness Research Institute](#) at Indiana University Southeast in New Albany. In extreme cases shyness can even be pathological, resulting in anxiety attacks and social phobia.



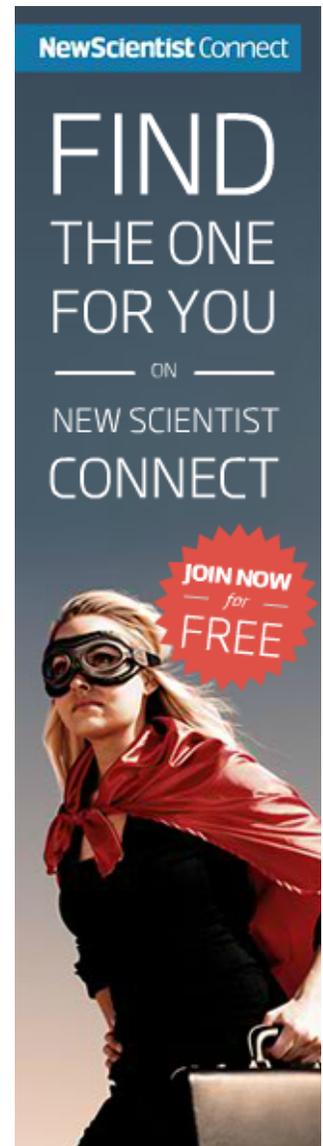
Party fears (Image: Graham Rawle)

In recent years it has emerged that we are not the only creatures to experience shyness. In fact, it is one of the most obvious character traits in the animal world, found in a wide variety of species from sea anemones and spiders to birds and sheep. But it is also becoming clear that in the natural world fortune doesn't always favour the bold. Sometimes the shy, cautious individuals are luckier in love and lifespan. The inescapable conclusion is that there is no one "best" personality – each has benefits in different situations – so evolution favours both.

Should we take a lesson from these findings and re-evaluate what it means to be a shy human? Does shyness have survival value for us too? Some researchers think so and are starting to find that people who are shy, sensitive and even anxious have some surprising advantages over more go-getting types. Perhaps it is time to ditch our negative attitude to shyness and accept that it is as valuable as extroversion. Carducci certainly thinks so. "Think about what it would be like if everybody was very bold," he says. "What would your daily life be like if everybody you encountered was like Lady Gaga?"

One of the first steps in the rehabilitation of shyness came in the 1990s, from work on salamanders. An interest in optimality – the idea that animals are as efficient as possible in their quest for food, mates and resources – led Andrew Sih at the University of California, Davis, to study the behaviour of sunfish and their prey, larval salamanders. In his experiments, he couldn't help noticing differences between individual salamanders. Some were bolder and more active than others. They ate more and grew faster than their shyer counterparts, but there was a downside. When sunfish were around, the bold salamanders were just "blundering out there and not actually doing the sort of smart anti-predator behaviour that simple optimality theory predicted they would

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do", says Sih. As a result, they were more likely to be gobbled up than their shy counterparts.

Until then, the idea that animals have personalities – consistent differences in behaviour between individuals – was considered controversial. Sih's research forced a rethink. It also spurred further studies, to the extent that today the so-called "shy-bold continuum" has been identified in more than 100 species. In each of these, individuals range from highly "reactive" to highly "proactive": reactive types being shy, timid, risk-averse and slow to explore novel environments, whereas proactive types are bold, aggressive, exploratory and risk-prone.

Why would these two personality types exist in nature? Sih's study holds the key. Bold salamander larvae may risk being eaten, but their fast growth is a distinct advantage in the small streams they normally inhabit, which may dry up before more cautious individuals can reach maturity. In other words, each personality has advantages and disadvantages depending on the circumstances. Since natural environments are complex and constantly changing, natural selection may favour first one and then the other or even both simultaneously.

The idea is illustrated even more convincingly by studies of a small European bird, the great tit. The research, led by John Quinn at University College Cork in Ireland, involved capturing wild birds and putting each separately into a novel environment to assess how proactive or reactive it was. Some hunkered down in the fake tree provided and stayed there for the entire 8-minute trial; others immediately began exploring every nook and cranny of the experimental room. The birds were then released back into the wild, to carry on with the business of surviving and breeding. "If you catch those same individuals a year later, they tend to do more or less the same thing," says Quinn. In other words, exploration is a consistent personality trait. What's more, by continuously monitoring the birds, a team led by Niels Dingemans at the Max Planck Institute for Ornithology in Seewiesen, Germany, observed that in certain years the environment favours bold individuals – more survive and they produce more chicks than other birds – whereas in other years the shy types do best (*Proceedings of the Royal Society B*, vol 271, p 847).

A great tit's propensity to explore is usually similar to that of its parents and a genetic component of risk-taking behaviour has been found in this and other species. Even so, nurture seems to play a part in forming animal personalities too (see "[Nurturing Temperament](#)"). Quinn's team has also identified correlations between exploring and key survival behaviours: the more a bird likes to explore, the more willing it is to disperse, take risks and act aggressively. In contrast, less exploratory individuals were better at solving problems to find food (*Proceedings of the Royal Society B*, vol 279, p 1731).

The trait even predicts the number of sexual partners a male great tit will have. Samantha Patrick at the Chizé Centre for Biological Studies, France, found that exploratory males are more likely to be unfaithful to their nest mate. However, they were also more likely to be cuckolded than shyer, more attentive males (*Proceedings of the Royal Society B*, vol 279, p 1724).

Memory boost

The benefits of shyness are not always as clear as those of boldness, but careful observation is starting to reveal some. Grant Brown at Concordia University in Montreal, Canada, and colleagues wondered how an animal's personality affects the way it responds to the threat of a predator. Using juvenile rainbow trout, they first assessed where each fell on the shy-bold continuum by measuring how long it took to escape from a chamber. Then they trained the fish to fear a chemical cue consisting of tiny amounts of pulverised rainbow trout and pumpkinseed fish, one of its predators. Shy and bold individuals were equally adept at learning to treat the odour as an alarm cue, and at responding to it after 24 hours. However, eight days later, only the shy fish still responded intensely to the mixture (*Behavioral Ecology and Sociobiology*, vol 67, p 43). The researchers conclude that shy rainbow trout have a better long-term memory, at least for signs of danger, which would allow them to assess risks from predators more effectively than bold individuals.

Another advantage of shyness has been found in western bluebirds, a species that has been spreading across North America for the past 40 years. Renee Duckworth at the University of Arizona in Tucson found that aggressive males are the best colonisers – their bold personalities enable them to acquire big territories and often to outcompete any resident mountain bluebirds. But as habitats start to fill up, shyer males begin to have the edge. That's because they are more attentive fathers and in an established habitat where resources are abundant, they successfully raise more offspring than aggressive males. Intriguingly, Duckworth also found that bluebird mothers tailor the personalities of their chicks to best fit the environmental conditions. Older chicks tend to be more aggressive than their younger siblings, so by manipulating the order in which female and male eggs are laid, mothers can produce non-aggressive males when resources are abundant, or aggressive ones when resources are scarce and colonisation is the best option (*Philosophical Transactions of the Royal Society B*, vol 364, p 1075).

In the wild, shyness clearly has its benefits – it would not be so prevalent otherwise – but that doesn't necessarily make it great for humans too. For a start, animal and human shyness are not directly analogous. In us, it refers to an individual's awkwardness and apprehension in social situations, involving elements of self-consciousness and fear of social judgement, a different meaning than that used for animals. Despite this, there is common ground. Researchers characterise human personality along five dimensions – conscientiousness, agreeableness, openness to new experiences, extroversion and neuroticism – the so-called "Big 5". Comparing these traits with animal personalities, Lars Penke at the University of Edinburgh, UK, has found that the shy-bold continuum shares many features with the traits of neuroticism/emotional stability and introversion/extroversion (*Philosophical Transactions of the Royal Society B*, vol 365, p 4043).

Still, there is an obvious problem when trying to assess whether natural selection favours shyness in humans. "It's difficult to really establish fitness consequences of human personality traits," says Penke. "We're living in an age of rational family planning and contraception, making it difficult to directly assess the historical fitness benefits that shaped the evolution of personality." Instead, researchers often rely on indirect indicators of fitness in humans, such as attractiveness to the opposite sex, number of sexual partners, simple health or survival indices like accident rates, or basic indices of social success such as socio-economic status.

Nevertheless, one can imagine many potential evolutionary advantages of being a reactive, risk-averse "pauser" rather than a proactive, risk-taking opportunity-seizer. And some studies do back up these intuitions. For example, work by Daniel Nettle at Newcastle University, UK, suggests that although introverts tend to have fewer sexual partners than extroverts, they are also less likely to be hospitalised for accidents or illness (*Evolution and Human Behavior*, vol 26, p 363). Perhaps more surprisingly, a new study indicates that anxious types are less prone to post-traumatic stress disorder. The researchers, led by Yair Bar-Haim at Tel Aviv University, found that soldiers in the Israeli Defence Force with a gene variant that increases anxiety and vigilance were less likely to develop PTSD following traumatic experiences in war zones (*JAMA Psychiatry*, vol 70, p 401).

Then there is the research of Elaine Aron at the State University of New York, Stony Brook. She studies what she calls sensory processing sensitivity – which equates to the reactive end of the shy-bold continuum. Her work suggests that SPS is an inherited trait found in about 20 per cent of people, linked with introversion and neuroticism but also with an increased sensitivity to everything from music, art and novel situations to pain, drugs and coffee. In brain-imaging studies, Aron found that individuals who rated high for SPS had greater activity in areas involved in visual attention and processing in a task that required them to detect small differences between photos (*Social Cognitive and Affective Neuroscience*, vol 6, p 38). This indicates, she argues, that their enhanced responses to subtleties in the environment are underpinned by deeper cognitive processing of internal and external stimuli than is found in most people.

Findings such as these point to the idea that reactive and proactive types represent two viable strategies in humans, just as they do in other animals. If so, then the relative success of each strategy depends on the context. "Nobody knows what tomorrow's going to bring, so one always

needs to be cautious about the hypothesis that self-confidence and boldness are inherently good," says Jay Belsky at the University of California, Davis. In fact, his research reveals that children with genes that predispose them towards anxiety and sensitivity are more developmentally malleable than their gung-ho peers – their future personality is more easily influenced by environmental factors such as upbringing ([New Scientist, 28 January 2012, p 42](#)). "When things go bad in life, they are adversely affected, but when things go well, they thrive," he says.

The trouble is that in societies where boldness is king, shy people have a tough time – even to the point where shyness is considered a psychiatric disorder. "There is an increasing tendency to medicalise shyness and treat it with pills," says Carducci. "A pill that lowers arousal doesn't teach shy people what to do." At the Shyness Research Institute he and his colleagues are devising practical pointers, instead of pills, with which people can become "successfully shy".

Meanwhile, there are signs that the tide is turning in favour of shyness. Last year, the book *Quiet: The power of introverts in a world that can't stop talking* created quite a buzz. Its author Susan Cain wrote in *The New York Times*: "Shyness and introversion – or more precisely, the careful, sensitive temperament from which both often spring – are not just normal. They are valuable. And they may be essential to the survival of our species."

So will the shy inherit the earth? Or will it be the bold? If animal personalities have anything to tell us, it's that we cannot have one without the other. When it comes to personality, variety really is the spice of life.

This article appeared in print under the headline "Survival of the shyest"

Nurturing Temperament

Among sticklebacks – small stream-dwelling fish – dads take care of the babies by protecting the nest, fanning the fry within and chasing away intruders. As the fry's swimming ability improves, the fathers chase them around. "If they start to go too far from the nest, he will actually pick them up in his mouth and spit them back into the nest," says Alison Bell at the University of Illinois at Urbana-Champaign. She suspects this helps the young learn how to deal with threats, gaining experience from interacting with a non-threatening "predator". But the attentiveness of dads varies enormously, and Bell was curious to know what impact parenting styles might have on an offspring's personality.

In a new experiment comparing father-reared versus orphaned sticklebacks, Bell is now testing the hypothesis that offspring with doting dads are more likely to develop shy, cautious personalities that help protect them against predation, while those with inattentive fathers behave no differently from orphans. Her work so far suggests that early social interactions, at least in sticklebacks, are critical in determining how bold or shy an individual grows up to be (see main story).

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