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- ▶ If  $s$  is evolutionarily stable,  $(s, s)$  is a Nash equilibrium
- ▶ If  $(s, s)$  is a Nash equilibrium,  $s$  is not necessarily evolutionarily stable

# Definition

Another definition for evolutionarily stable strategies:

In a 2-player symmetric game, a strategy  $s$  is **evolutionarily stable** if:

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  - ▶ If  $u(s, s) > u(s, s^*)$  for all  $s^*$ , there is nothing else to check
  - ▶ The second condition says “if a mutation does equally well against the original, the original must do better against the mutation than the mutation does against itself”
  - ▶ This definition is far easier to check

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- ▶  $p$  is a mixed evolutionarily stable strategy

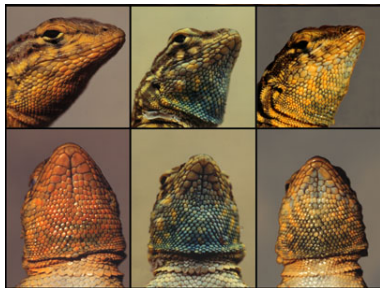
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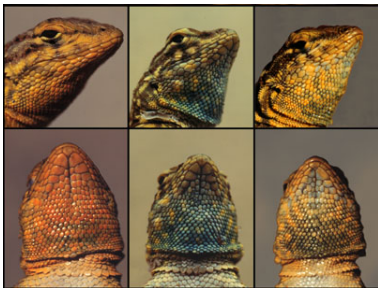
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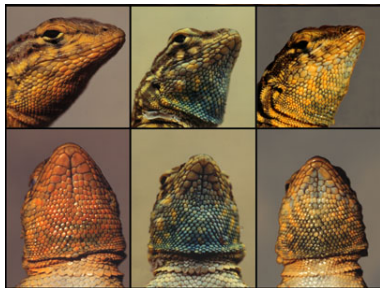


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Common side-blotched lizard

- ▶ Males have three possible colorings (orange-blue-yellow)
- ▶ Colorings corresponding to mating habits

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- ▶ Only evolutionarily stable strategy is Orange



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- ▶  $(\frac{1}{3}, \frac{1}{3}, \frac{1}{3})$  is evolutionarily stable