

Avoiding Evolutionary Mismatch

A Basis for a New Approach for Release Preparation

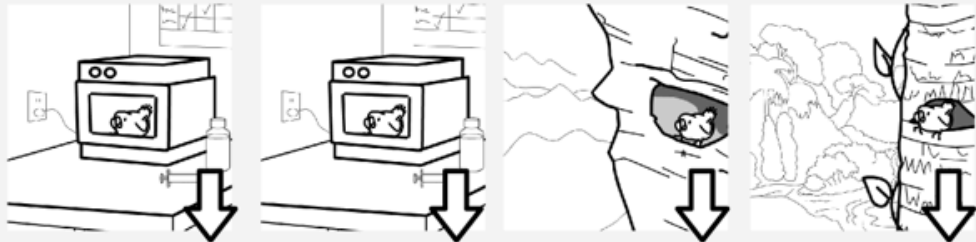
Evolutionary processes affect behaviors through genes. The genes interact with the environment during the development of the animal to produce normal behaviors. This interaction can allow for one set of genes to prepare a species for a variety of different living environments. During growth and development an animal gains locally adaptive survival behaviors through gene-experience interaction, as well as cultural inheritance.

These birds have similar genes but each is individually adapted to a different environment.



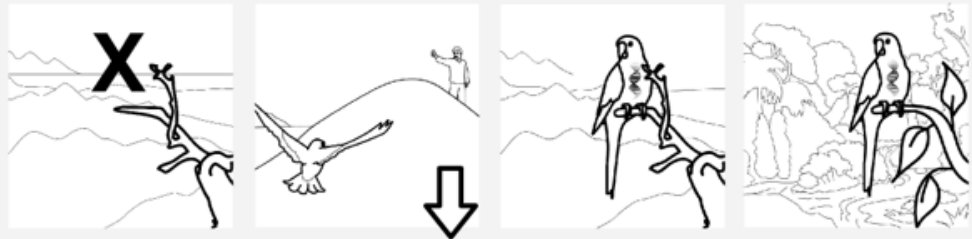
This natural, flexible system for gaining behavior is adapted to function in the ancestral environment of the animal. If the current environment is too different from the ancestral environment, there is a mismatch. The animal's system is not infinitely flexible, so a mismatched environment during development can have dysfunctional consequences.

However, in the captive environment critical windows for skill learning are often missed.



Bird Recovery International believes that mismatch between the developmental environment and the release environment is a major issue in captive breed and release programs. As part of our research goals we seek to identify how mismatch occurs during development and design solutions.

The first captive bird cannot survive in the wild due to rearing that mismatches its evolutionary needs.



Through developmentally important interventions during early life, the second captive bird possesses survival behaviors. Techniques are developed using Mismatch Theory: Identifying the differences between the ancestral and captive environments then observing which differences lead to specific behavioral traits.



See video of our process in action and view the results with macaws and conures at BirdRecoveryInternational.com



Why Environmental Mismatch Occurs

Childhood Is Adaptive

Childhood interactions with the environment calibrate the animal's instinctive behaviors to match the particulars of the specific environment, the one of many variations it may be born into.

High Mortality Zones:

Busy highways: **Deer, Turtles & Armadillos**
Clear-cut logging areas: **Spotted Owls**
Cities: **Cougars**

Decline in Species Numbers:

Extensive old growth logging: **Imperial Woodpecker & Tanimbar Corella Cockatoo**
Rise in sea temperature: **Coral**
Hydroelectric dams: **Salmon**

Extirpation or Extinction:

Cultivated agricultural tracts of land: **Sage Grouse**
Barbed wire fenced ranch land: **American Bison**
Extinction area of symbiotic species: **Thick-billed Parrot**
Extensive sport hunting: **Thick-billed Parrot, Carolina Parrot & Passenger Pigeon**

Adaptive Plasticity Limits

If an area within the historical range is altered beyond the limits of the animal's adaptive processes, the species may suffer from zones of high mortality, a decline in the species numbers or extirpation in that particular environment.

Natural selection has produced the species with an adaptive developmental system, calibrating individuals to remain functional in environments within a limited range of parameters.

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Why Developmental Mismatch Occurs

Ontogenetic Behavior

Adaptive childhood plastic behavior



Adult version of adaptive operant behavior

- Operant Behavior - Individual-specific & environment responsive behavior with great variation throughout adulthood. Adult modifications to the behavior may occur over minutes or hours.

Phylogenetic Behavior

Adaptive childhood plastic behavior



Adult version of involuntary behavioral patterns

Childhood calibration of genetically influenced respondent innate behavioral patterns adapted to the specific conditions of the environment the animal will live its life.

- Fixed Action Patterns – Species-specific innate behavior typical across the species with minimal variations throughout adulthood. Adult modifications to the behavior may occur over months or years.
- Action Patterns – Species-specific innate behavior typical across the species with greater individual variation throughout adulthood. Adult modifications to the behavior may occur over weeks or months.

Genetically influenced species-specific behavior is very slow to change in its adult form once calibrated to the specifics of the environment during pliable childhood developmental phase.

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Note: Some respondent behavior is calibrated and developed after childhood.