

# An Introduction to Monads

## Abstract

Monads are one of the cornerstone concepts of category theory, and one of the first that were applied, in particular to computer science. One way to motivate and interpret monads is as ways to model "extra effects", or "extra outcomes", for example to account for randomness, non-determinism, or errors and exceptions. We will review and motivate the definitions of monads and of their Kleisli morphisms, give several examples, and show, as a case study, how to use them to incorporate probabilistic effects. Depending on time and interest we may also mention comonads, which are the dual concept. Most of the examples will be taken from these notes, <https://arxiv.org/abs/1912.10642>.