### Why

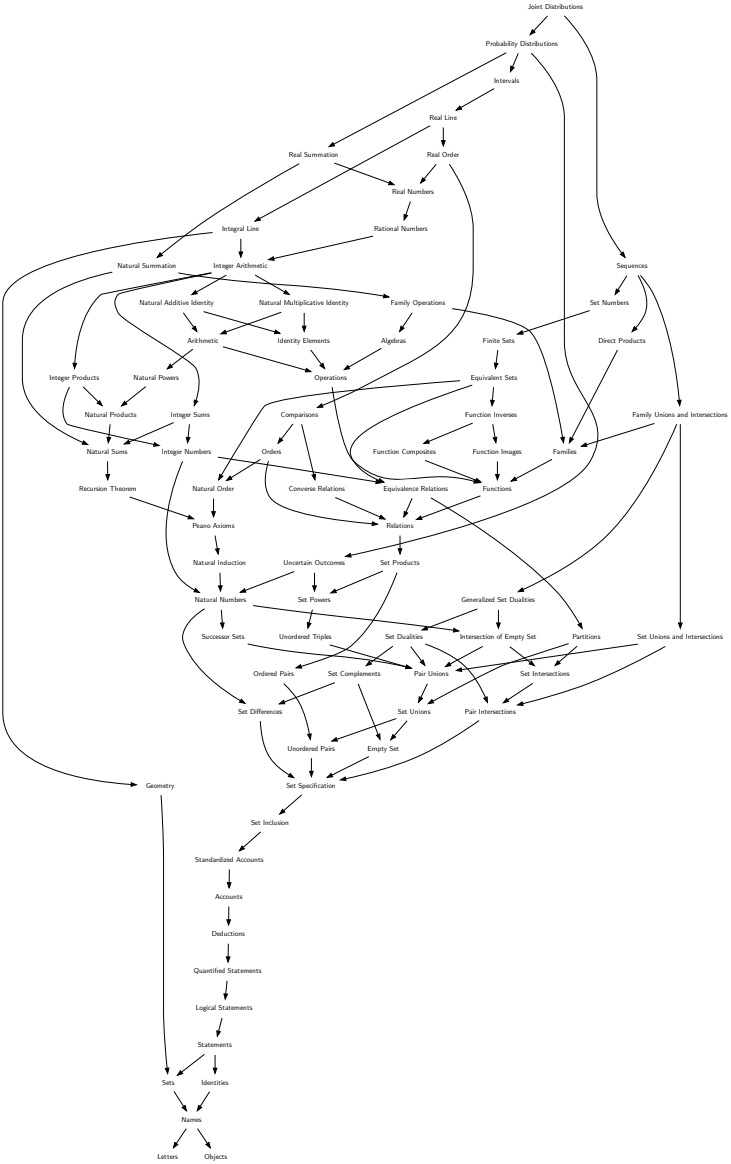
Suppose we flip a coin $n$ times. How should we define a probability distribution on $\{0,1\}^n$. Suppose instead we flip $n$ different coins, each once? How now?

### Discussion

If we model the outcome that coin $i$ lands heads as 1 and that it lands tails by 0, then we are asking to treat of uncertain outcomes from the set $\{0,1\}^n$ of length-2 sequences. Here $x \in \{0,1\}^n$ could correspond to the outcome of flipping one coin $n$ times or the outcome of flipping $n$ different coins. This is a simple example of a frequent and obvious phenomenon in mathematics wherein the same mathematical model (here the outcome set) can be used to model different situations in the real world (c.f. numbers, etc.).

### Definition

Consider a distribution over a product of $n$ sets, where the product is indexed by the first $n$ natural numbers. We call the distribution a *joint distribution* with $n$ components.


Joint Distributions
Probability Distributions
Intervals
Real Line
Real Summation
Real Order
Real Numbers
Integral Line
Rational Numbers
Natural Summation
Integer Arithmetic
Sequences
Natural Additive Identity
Natural Multiplicative Identity
Family Operations
Set Numbers
Arithmetic
Identity Elements
Algebras
Finite Sets
Direct Products
Integer Products
Natural Powers
Operations
Equivalent Sets
Natural Products
Integer Sums
Comparisons
Function Inverses
Family Unions and Intersections
Natural Sums
Integer Numbers
Orders
Function Composites
Function Images
Families
Recursion Theorem
Natural Order
Converse Relations
Equivalence Relations
Functions
Peano Axioms
Relations
Natural Induction
Uncertain Outcomes
Set Products
Natural Numbers
Set Powers
Generalized Set Dualities
Successor Sets
Unordered Triples
Set Dualities
Intersection of Empty Set
Partitions
Set Unions and Intersections
Ordered Pairs
Set Complements
Pair Unions
Set Intersections
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Geometry
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects