Deductive vs. Inductive?

As far as we're concerned thus far, there are two different kinds of argument forms: inductive and deductive. Within those argument forms, however, there are further distinctions to be made. Not all deductive arguments are created equal, and not all inductive arguments are either.

	Deductive
Valid	In light of the assumption that the premises are true, it necessarily follows that the conclusion is true.
Invalid	In light of the assumption that the premises are true, it **does not** necessarily follows that the conclusion is true. (hard to come up with examples)

Valid = An argument such that if the premises were true, then the conclusion would necessarily follow.
　　　All toasters are items made of gold.
　　　All items made of gold are time-travel devices.
　　　Therefore, all toasters are time-travel devices.

Invalid = An argument such that if the premises were true, then the conclusion would not necessarily follow.
　　　Either disciplining people is always wrong or it's not always wrong to discipline people for committing crimes.
　　　Disciplining people hurts them.
　　　Therefore, disciplining people is always wrong.

	Deductive
Sound	The premises of a valid argument are **in fact** true. Thus, the conclusion is guaranteed to be true.
Unsound	The premises of a valid argument are either: (i) **in fact** false, (ii) the argument is invalid, or (iii) both. Thus, the conclusion is not guaranteed to be true.

*There *are* many valid arguments which are *not* sound. Understanding this distinction is essential!

Sound = An argument such that it is valid **with** all true premises.
　　　No felons are eligible voters.
　　　Some professional athletes are felons.
　　　Therefore, some professional athletes are not eligible voters.

Unsound = Either a valid argument with one or more false premises, an invalid argument, or both.

All spider monkeys are elephants.
No elephants are animals.
Therefore, no spider monkeys are animals.

	Inductive
Strong	If it probably follows that, given the total truth* of the premises that the conclusion *is true*, then the argument is strong.
Weak	If it does not probably follow that the premises support the truth of the conclusion, then the argument is weak.

*This notion of strong relies on the the total evidence requirement being met!

Strong = An inductive argument such that if the premises were true, then the conclusion would probably be true.

> It has snowed in Massachusetts every December in recorded history.
> Therefore, it will snow in Massachusetts this coming December.

Weak = An inductive argument such that if the premises were true, the conclusion would not be true on probabilistic grounds.

> Steve Howe, Alan Wiggins, and LaMarr Hoyt are baseball players and all have been involved with drugs.
> Therefore, it must be the case that all baseball players use drugs.

	Inductive
Cogent	The premise(s) of a **strong** inductive argument are *in fact* true. Thus, the conclusion is likely to be true.
Uncogent	An inductive argument that is weak which has: (i) one or more false premises,(ii) fails to meet the total evidence requirement, or (iii) any combination of these.

Cogent = A strong inductive argument with all true premises.

> Every day that I have been alive, the sun has risen in the East and set in the West.
> Therefore, tomorrow, the sun will rise in the East and set in the West.

Uncogent = A strong inductive argument with one or more false premises, that does not meet the total evidence requirement, or fails to meet a combination of these two criteria.

> Constructing the great pyramid at Giza required lifting massive stone blocks to great heights.
> Probably the ancient Egyptians had some antigravity deceive to accomplish this feat.

Decision Tree:

Deductive ↙↘		Inductive ↙↘	
Valid ↙↘	Invalid ↓	Strong ↙↘	Weak ↓
Sound / Unsound	Unsound	Cogent / Uncogent	Uncogent