Ordinary Induction vs Strong Induction vs WOP

Always use Strong Induction?
Ordinary is a special case of Strong, so why bother with it?
- helps a reader to know that \( k < n \) don't matter for \( n+1 \)
- more intuitive (?)

Always use Ordinary Induction?
Suppose \( \forall m. P(m) \) proved by Strong Induction.
Inductive step assumed \( \forall k \leq n. P(k) \)
and proved \( P(n+1) \).

Always use Ordinary Induction?
revise induction hypothesis to:
\[ Q(n) ::= \forall k \leq n. P(k) \]
Now same proof becomes Ordinary Induction.

Ordinary Induction replaces Strong
So Strong Induction adds no power. Just decorate a Strong proof with some \( \forall \)'s and it becomes Ordinary.

Strong vs. Ordinary
Why use Strong?
cleaner: no need for \( \forall k \leq n \). all over.
**WOP vs Induction?**

Same deal: easy to rephrase any Induction proof into WOP and vice-versa. So Induction & WOP are rephrasing of same logical principle. Which to use is a matter of taste.

**Why WOP first?**

Exam performance & surveys show about 20% of students don’t “get” induction. They worry that assuming $P(n)$ is circular and/or they can’t do induction proofs. This baffles us and the other 80%.

No one has problems believing the WOP, and they have no harder time using WOP than Induction. So to get going on interesting proofs right away, we start with WOP.