08-A2

高级搜索树

伸展树：双层伸展

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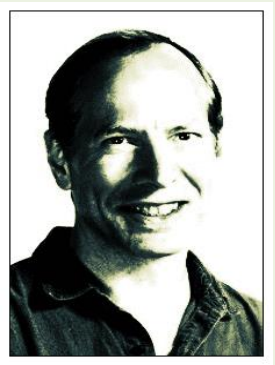
贾政道：“不用全打开，怕叠起来倒费事。”詹光便与冯紫英一层一层折好收拾。

双层伸展

❖ Self-Adjusting Binary Trees

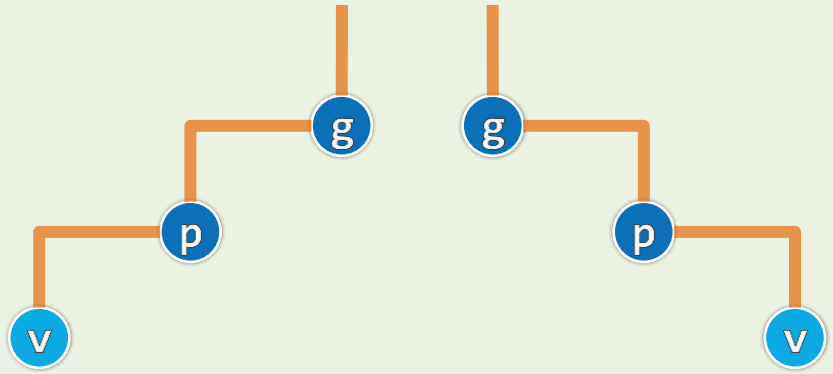


D. D. Sleator

R. E. Tarjan

J. ACM, 32:652-686, 1985

❖ 构思的精髓：向上追溯两层，而非一层



❖ 反复考察祖孙三代：

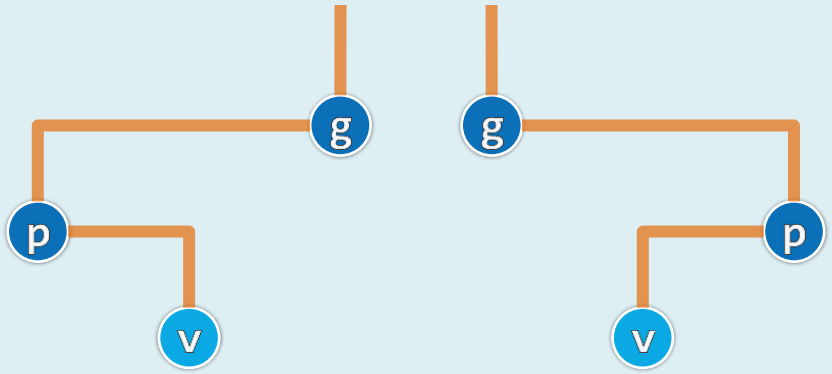
g = parent(p), p = parent(v), v

❖ 根据它们的相对位置，经两次旋转

使v上升两层，成为（子）树根

❖ 如此，性能的确会有改善？

❖ 具体地，应该如何旋转？



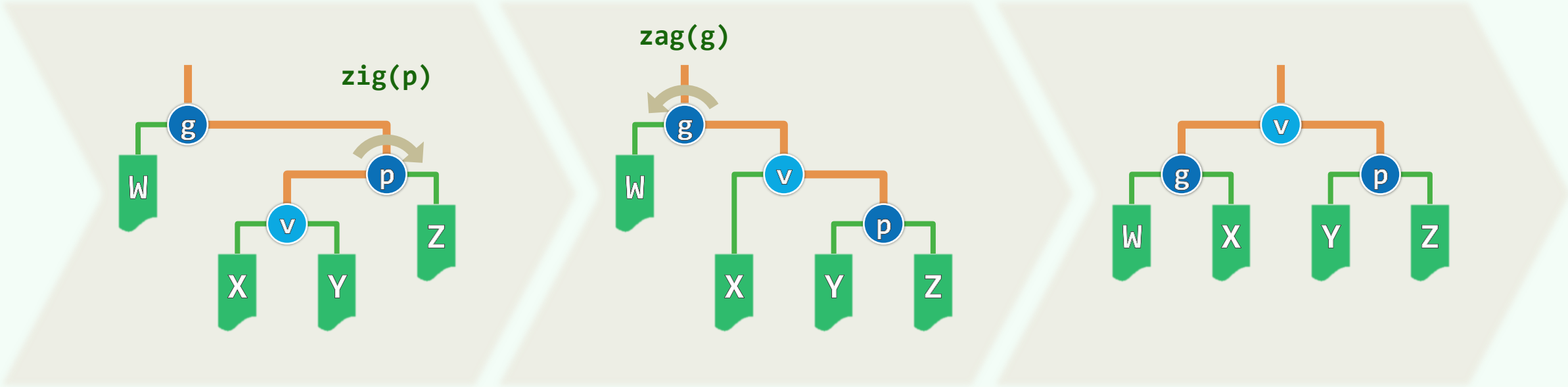
zig-zag / zag-zig

❖ 此时的v按中序遍历次序居中

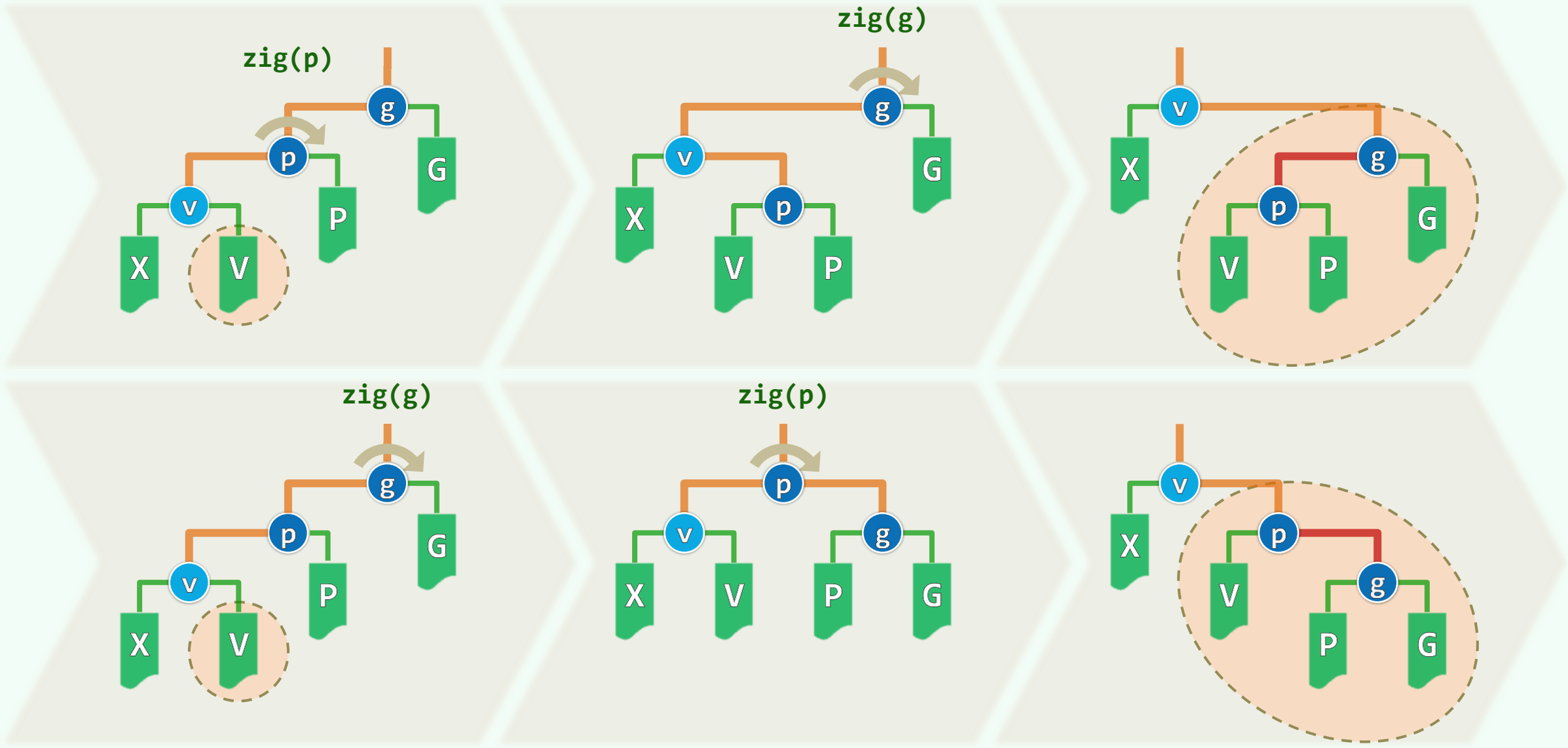
❖ 如此调整的效果，与逐层调整别无二致！

❖ 故若欲使之成为根，最终无非一种姿势

❖ 难道，就这样平淡无奇？



zig-zig / zag-zag



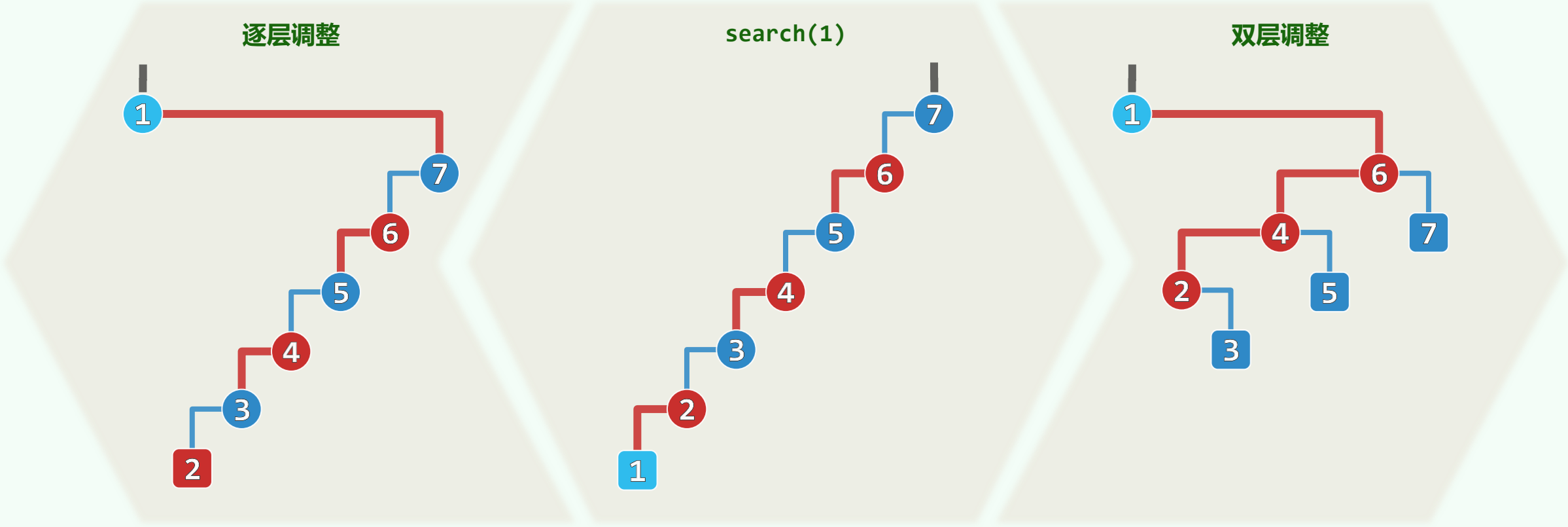
zig-zig / zag-zag

❖ 节点访问之后，对应路径的长度随即折半

//含羞草般的折叠效果

❖ 最坏情况不致持续发生！

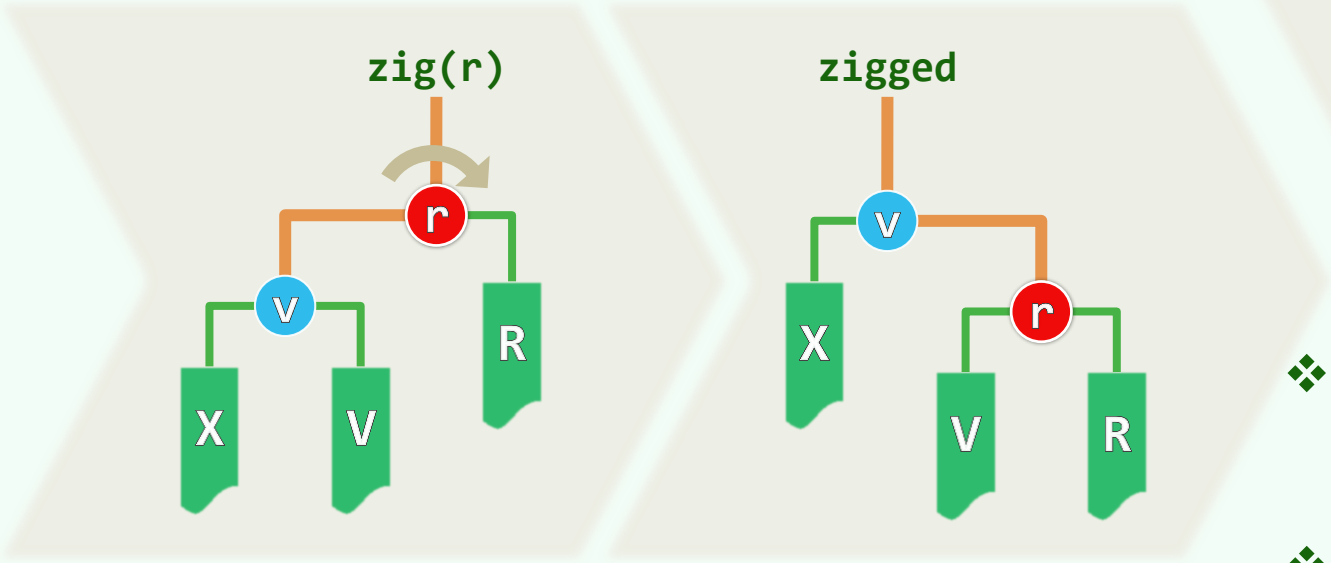
习题[8-2]：伸展操作分摊仅需 $\mathcal{O}(\log n)$ 时间

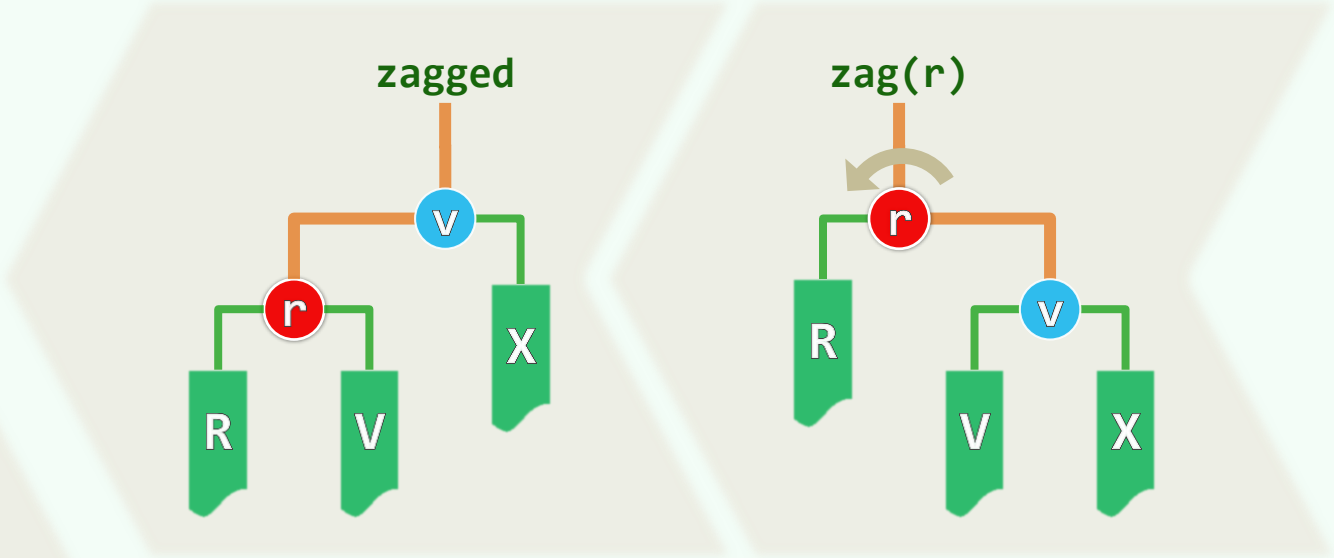


zig / zag

❖ 要是v只有父亲，没有祖父呢?

❖ 此时必有v.parent() == T.root()





❖ 只需做单次旋转：zig(r)或zag(r)

❖ 好在，这种情况至多（在最后）出现一次