Bonsai On A Budget

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MMM YYYY

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Walworth Garden EST. 1987

The PHOENIX GARDEN

Learning Outcomes

Theory

- Be aware of the history and culture of bonsai
- Understand (at a high level) how a bonsai is produced
- Understand (at a high level) what distinguishes good and bad bonsai
- Know how to maintain a bonsai on a day-to-day basis
- Experience the key activities of re-potting, pruning and wiring
- Be aware of inexpensive options for further learning and practice

Practical

- Watering bonsai
- Wiring a bonsai pot for re-potting
- Exposing the nebari
- Potting the prepared tree
- Pruning for bulk, congestion and taper
- Wiring for shape

Bonsai: What & Why

Defining bonsai

- A bonsai is a **living trompe-l'oeil**: a small tree that appears to be a scaled-down large tree.
- Almost any kind of tree can become a bonsai (plus a few things that aren't trees!)
- "Bonsai" traditionally referred to Japanese schools, but has become a generic term

Why 'Sai?

- Hands-on education in plant science!
- Learn to see extra layers of beauty in nature
- Good practical hobby with interesting culture
- Sense of control and responsibility

To see a World in a Grain of Sand
And a Heaven in a Wild Flower
Hold Infinity in the palm of your hand
And Eternity in an hour

- William Blake

Bonsai: A Potted History

China

- Daoist mysticism: recreation of magical sites in miniature
- Penjing (盆景) / Penzei (盆栽) = the art of miniature landscapes (pre 600AD)
- Popular amongst Buddhist monks, and – later – aristocracy
- Heavily impacted by Mao's Cultural Revolution: seen as a bourgeois pastime

Japan

- First records c. 1200AD; known as Hachi-no-Ki ("potted trees" – also the name of a famous play!)
- Heavy Zen / Chan Buddhist influence: beauty through austerity, sophistication in simplicity and perfection from imperfection ("wabi-sabi")
- Increasingly popular from 1800s onwards; term "bonsai" (盆栽 – "tray planting") adopted
- Development of distinct styles (dramatic archetypes)
- Hit hard by World War 2, but revived in the aftermath (partly from enthusiasm of GIs)
- Exported to West from 1960s onwards, in parallel with Japan's "economic miracle"

Bonsai: Art & Science

Good bonsai practice is:

- **Authentic** - makes you think “tree”
- **Dramatic** – makes you think “TREE”
- **Pragmatic** – doesn’t make you think “*dead* tree”…

Pragmatism 1

How Not To Kill Your Tree

What Kind Of Tree Is A “Bonsai”, Anyway?
Trick question alert!

- Tree: “*a large, tall, woody, perennial plant with a single, unbranched, erect, self-supporting stem holding an elevated and distinct crown of branches with a total height greater than ten feet and a diameter greater than three inches*” – oy vey!
- Almost any tree species can be trained into a bonsai; many smaller plants can too

- Requirements for bonsai-ing:
  - Vascular plant (no mosses!)
  - Woody growth / “lignification” (no daisies!)
  - Secondary growth of trunk (no palms!)
  - Free-standing (no lianas!)
  - Deep roots (no grasses!)

- Desirable features
  - Attractive / interesting species
  - Small or pinnate leaves
  - Long-lived
  - Reasonably fast-growing
  - Easy to maintain / shape

- “Honorary” bonsai species
  - Woody climbers: ivy, wisteria, honeysuckle
  - Succulent / fleshy: dwarf jade, geranium
  - Chrysanthemum

I Had One Once, But It Died

What a bonsai needs to survive

- Environment
  - Indoor vs Outdoor
- Watering!!!!!
  - Single biggest killer of bonsai
  - “Root hairs” die easily in drought
  - Over-watering is also dangerous!
- Light
- Heat
  - Dormancy
- Airflow
- Pest Control
  - Animals: spider mites, scale bugs, aphids, caterpillars, vine weevil, squirrels
  - Plants etc: pearlwort, liverwort, wood sorrel, pennywort, nostoc
  - Caution: environmental issues!
- Fertiliser
  - “Balanced”: roughly even NPK
  - Organic => micronutrients
  - Caution: environmental & ethical issues!
- Bonsai are far harder to keep alive than most common pot plants!

Watering Your Bonsai
No, seriously, this is important

Why so serious?

1. Trees usually have deep tap-roots to draw water; they don't handle drying out well
    - …Especially conifers, for some reason
2. Good-quality bonsai soils / pots have really good drainage… so can dry off quickly
3. Bonsai soil is very compact and often moss-covered… so water tends to run off the surface
4. Traditional bonsai soil is inorganic, so lacks the "capillaries" of plant fibre that let water rise up through the pot
5. Even gardening experts routinely kill their first bonsai!

Watering methods

- Put in bucket of water (to just below brim) and wait for water to bubble up
    - …Then take out and allow to drain fully. *Never* leave standing in water for long periods – roots need oxygen too!
- Water from above three times, allowing the water to sink in between passes

Is it watered enough?

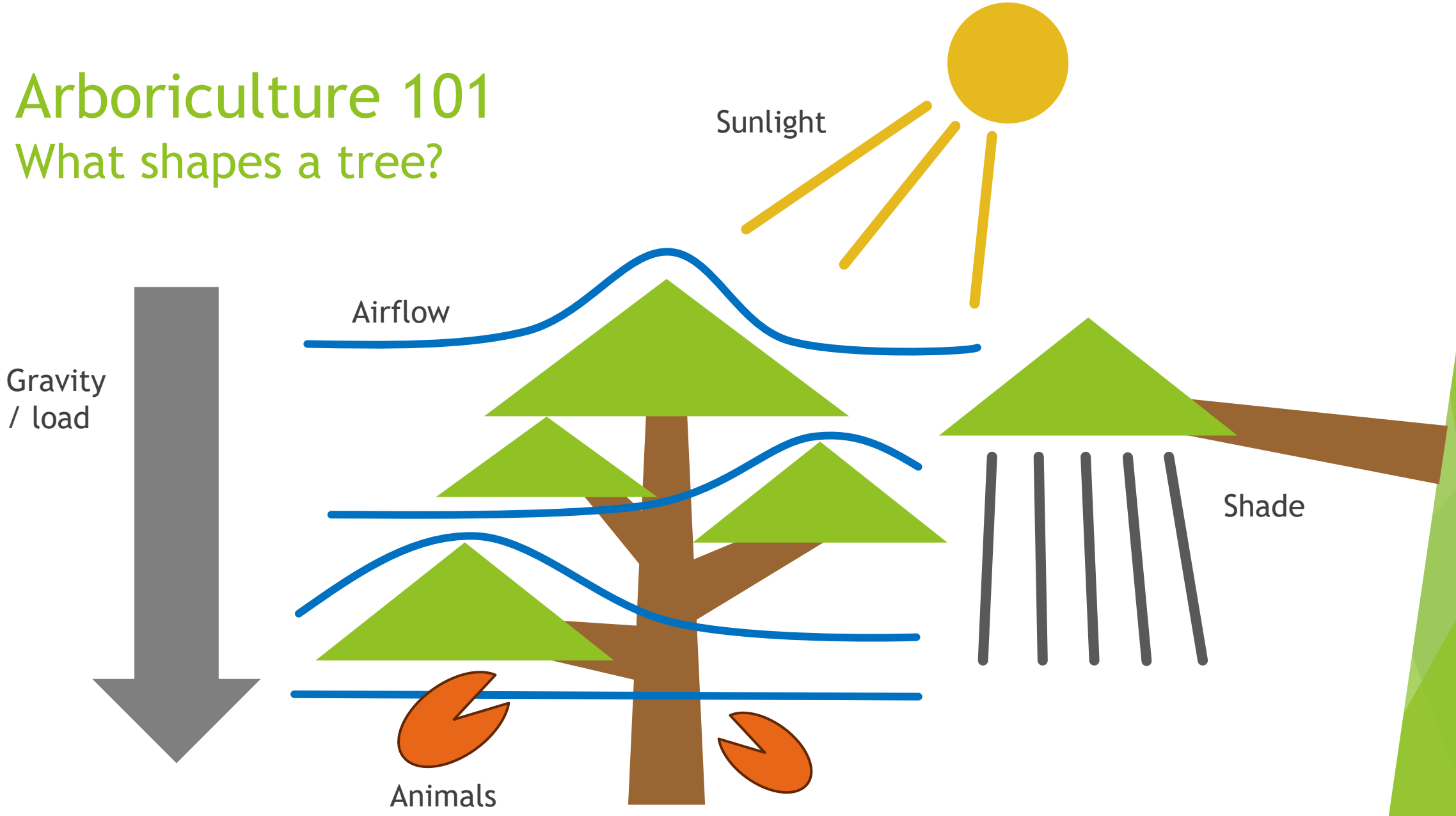
- Surface feels damp to back of hand
- Pot significantly heavier
- Water running out of hole in bottom

Authenticity & Drama

Thinking Like A Tree (That's Seen Some S**t)

Arboriculture 101

What shapes a tree?



Authenticity & Age
What makes a tree look mature?

- Taper
  - “Nebari” (根張り) = root flare / buttress
  - Trunk & branch flare: from base to apex / tip
  - Trunk-to-branch (and branch to sub-branch) ratio
- Canopy shape
  - Rounded triangle
  - Composed of rounded-triangle “pads” (for species that back-bud less readily)
- Trunk & branch behaviour
  - Short inter-node distance
  - “Ramification”: fractal splitting of branches
  - “Square-cube law”: big tree = proportionally heavier load = more curvature
  - “Ruptures”: jagged direction changes
- Texture
  - Bark
  - Dead-wood: advanced bonsai topic!

Art à la Japan
Catching the eye

It is self-evident that nothing concerning art is self-evident.

- Theodore Adorno (1969)

Key elements of visual design:

- Movement & rhythm
- Balance: symmetry vs asymmetry
- Similarity & harmony vs contrast & variety
- Perspective & proportion
- Repetition & continuation
- Unity: wow factor

Japan-specific additions:

- “Wabisabi” (侘び寂び – literally “forlorn rusticism”): austere, naturalistic, often hard-worn beauty and elegance
- Top-right to bottom-left traditional reading

Drama & Perspective
What makes a tree stand out?

- Well-defined “front”
  - Style is firmly established
  - Sense of strength or movement captured
  - Clear view of lower trunk
  - No crossed branches
  - Tree’s “centre of mass” is in middle of pot
- Taper (again!)
  - Taper appears stronger from viewpoint at base of tree
- Pot: picture-frame for tree
  - “Heavy” earthenware vs “light” glazed
  - Depth ≈ trunk thickness; width ≈ 2/3 canopy height (tall tree) or width (wide tree)
  - Style: heavy vs light, plain vs ornate
- Use of negative space
  - …Often in imitation of wind-flow or trunk death in full-scale trees
- Scaled-down decorations
  - Moss “grass”, accent plants, rocks (“suiseki”)

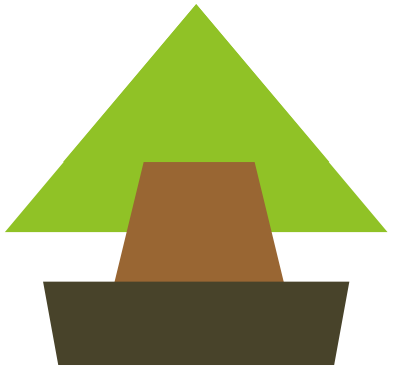
Flaws
What gives the game away?

- Weak / immature-looking branches
  - Suckers
  - Congested nodes
  - Under-slung / elbow branches
  - Lack of clear “leader” (dominant trunk / branch)
- Obvious tool marks
  - …Including wire scarring
- Excessive symmetry
  - …Especially handlebar branches
  - Asymmetry is a common theme in Japanese gardening!
- “Reverse taper”
- Unusual “habit” for species / genus
  - Google for pictures of wild tree to get ideas!
  - This rule is frequently ignored: e.g. small shrubs portrayed as large trees, boringly-shaped species made interesting, unrealistic pads
- Dead leaves and (unwanted) deadwood

Bonsai Styles

The most common four archetypes of… *thirty?* Really?!?

Formal Upright



- Strong, proud, “yang”
- Pot: unglazed earthenware; simple shape; bulging
- Can be hard to develop taper, especially on conifers

Cascade

- Flowing, falling
- Pot: deep to make space
- “Half-cascade” runs to base of pot; “cascade” goes below that

Informal Upright

- Relaxed, elegant, “yin”
- Pot: glazed; fluting; flowery
- Broad range of possible shapes
- Basically the default style!

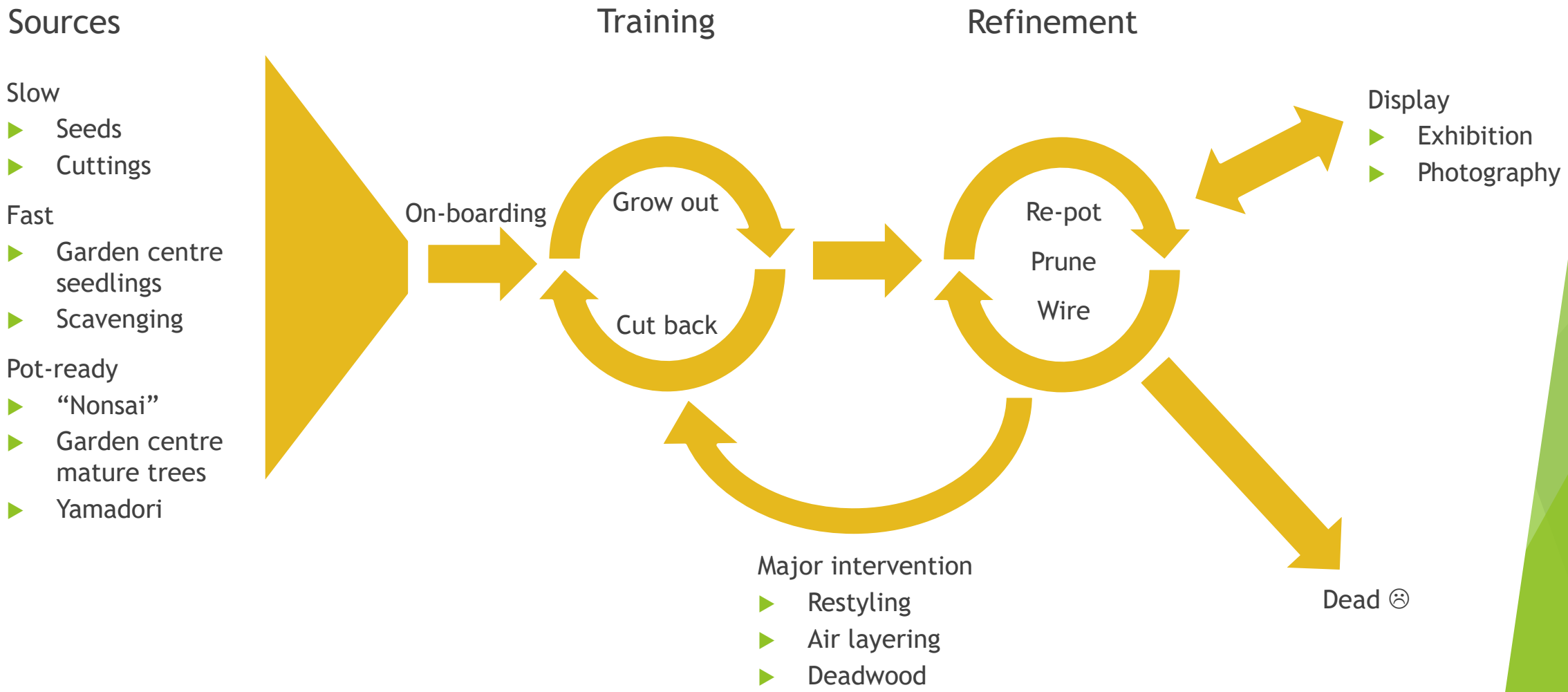
Literati

- Solitary, melancholy, bleak
- Trunk: bare, ruptured, calligraphic
- Pot: small to emphasise plant’s extravagant loneliness
- Style derived from woodcuts in classic Chinese drawing guide

Pragmatism 2

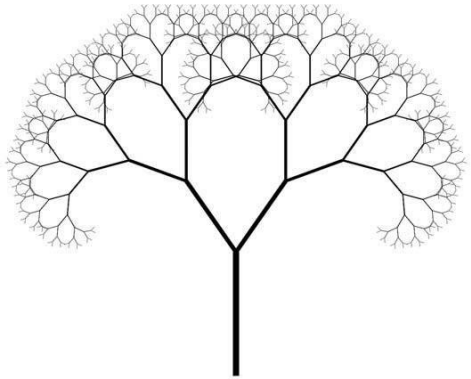
Making Life In Miniature

Bonsai Lifecycle



Why We Prune
It’s not just repressed sadism, honest

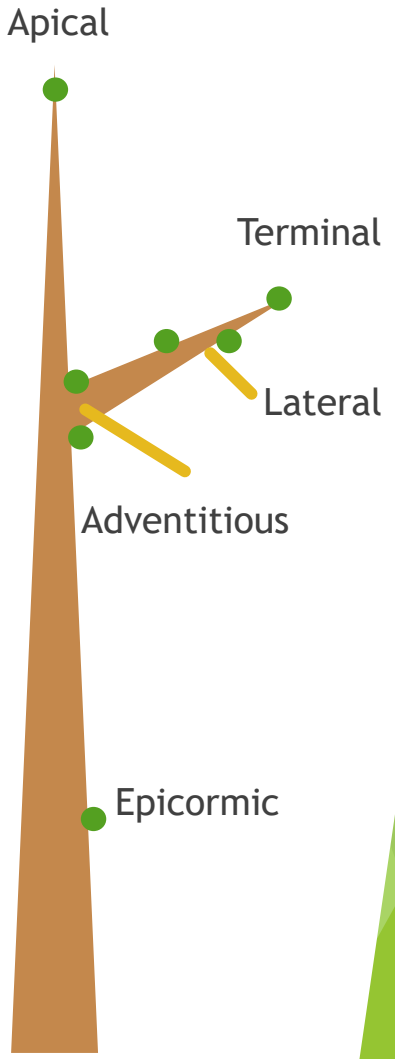
- Shape the tree
  - “Structural” pruning to shape trunk + primary branches and fit a bonsai style / archetype
  - Canopy pruning to create rounded-triangle shape(s)
- Shape the branch - encourage ramification and taper
  - Encouraging lateral growth by removing terminal / apical buds
  - Continuing the ramification process past the eye’s limits makes judging scale difficult and creates the illusion of great size



- Pick winners - before the tree can pick for us!
  - Improve spacing and remove congestion and “fluff”
  - “Balance energy”: force growth away from the apex towards more interesting (to us) areas
- Crowd management - reduction of green mass
  - Let light through to lower areas of the tree (pruning for “inner growth”)
  - Reduce water shock when re-potting

Botany & Pruning (1)
Not all trees are alike

- Types of growth
  - **Apical** growth from the tip of the trunk
  - **Terminal** growth from the tip of branches
  - **Lateral** growth from behind the tip
  - **Adventitious** growth from the base of branches
  - **Epicormic** growth from random spots on the trunk
- Back-budding (adventitious + epicormic*): Weak back-budding → we have to plan further ahead (e.g. leave sacrificial branches) to thicken the trunk
- Lateral growth: Dense lateral growth → we have to think in terms of zones along each branch instead of looking at individual sub-branches
- Apical dominance: Some trees (conifers especially) grow more strongly upwards
- Flushes per year: Usually two (Spring and Lammas) except for mountain-growing pines



* Warning: botanists use “back-budding” to mean something different!

Botany & Pruning (2)
Three main types of foliage

Broadleaf

Needle-bearing

Spiky / scaly

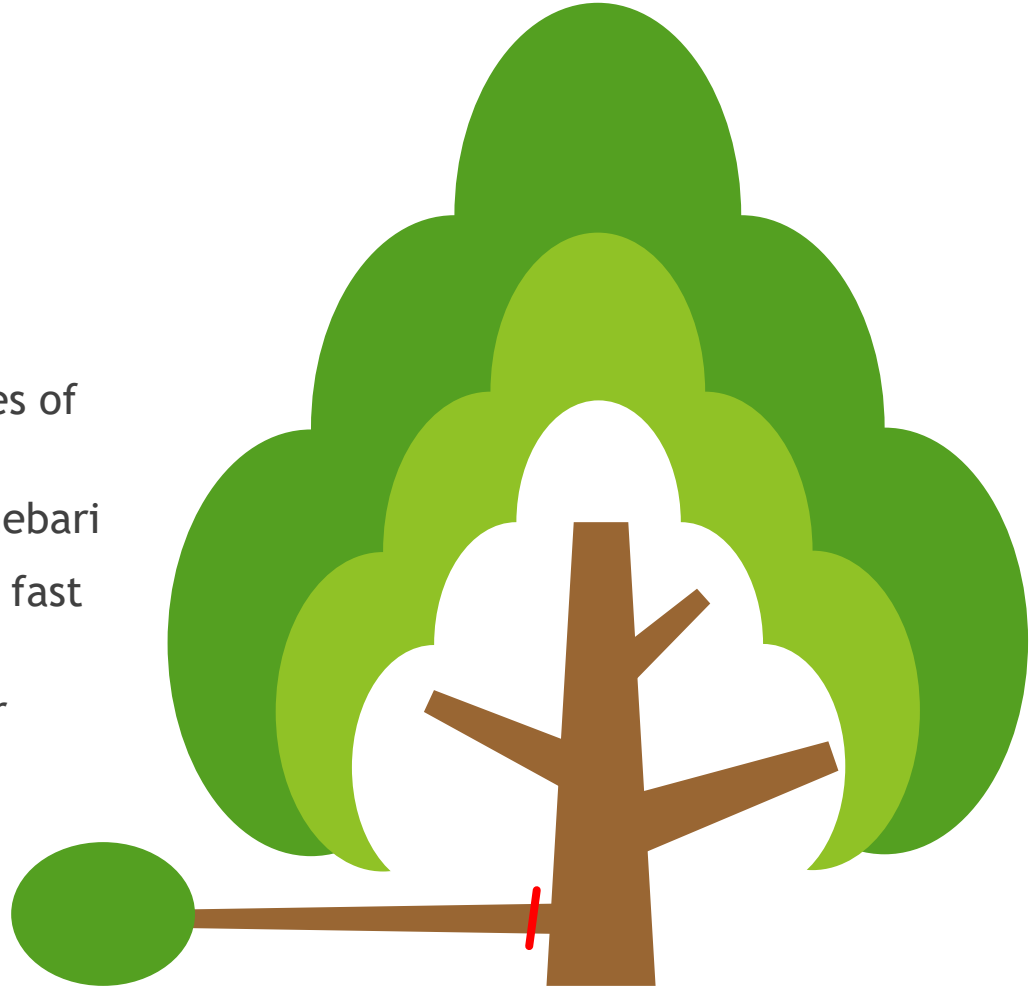
Structural Pruning
Building a solid foundation

Goals

- Select an appropriate style for the tree
- Identify and establish the trunk and first few branches of the bonsai
- Mark out sacrificial branches to thicken the trunk / nebari
- During the tree's "training" phase: make the most of fast woody growth
- Create a base for subsequent development of smaller branches and canopy

Approach

- Start from the base
- Clear branches from the lower trunk
  - Or mark for later removal, in which case remove all side-growth to avoid wasted energy
- Working up the tree, at each node remove all but two branches



Pruning for Ramification (1)

Broadleaf trees: playing in easy mode

Context

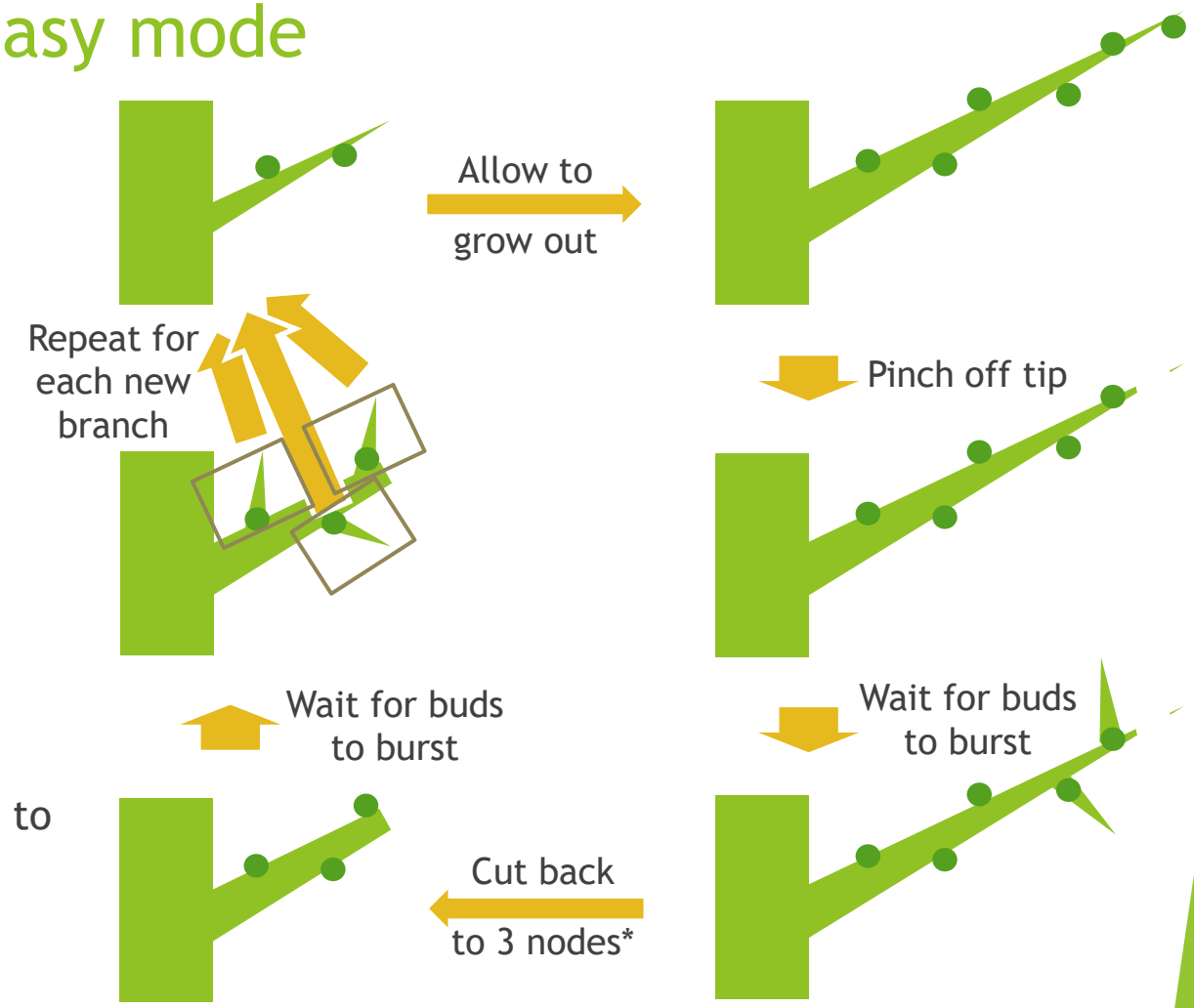
- Can handle loss of mass
- Back-buds readily
- Leaves may be simple or compound, alternating or opposite

Goals

- Reduced bulk of foliage
- Minimal wasted growth
- Strong taper along branch

Approach

- Once a branch is well-established, cut it back to “two heirs and a spare” (at least)
  - The spare is a sacrificial branch: it can be removed later if the heirs survive
  - One sub-branch will become the new “leader”; the other will be a side-branch



* Or 2 nodes (4 buds) for opposite leaves

Pruning for Ramification (2)
Needle-bearing trees: getting trickier

Context:

- No epicormic growth
- No lateral growth from old (needle-less) wood
- Often weak adventitious growth
- Often strong apical dominance

Goals

- Green growth should form pads / clouds or layers, floating above the branch
- Remove needles from trunk and base of branches to create old wood and permanently restrict future growth
- Control apical growth carefully to stop premature die-off of lower branches ("energy balancing")
- Cutting back tips (removing current-year terminal growth) is called "de-candling"

Approach

- Create ramification and taper following the same process as for broadleaf trees
- …but leave some lower branches as sacrificial branches to thicken the trunk
- Be sure that each new branch has some foliage at its tip, or it will die
- Don't panic if you have long branches without side-shoots: these can be made more compact by wiring!

Pruning for Ramification (3)
Spiky / scaly trees: *super* fiddly

Context:

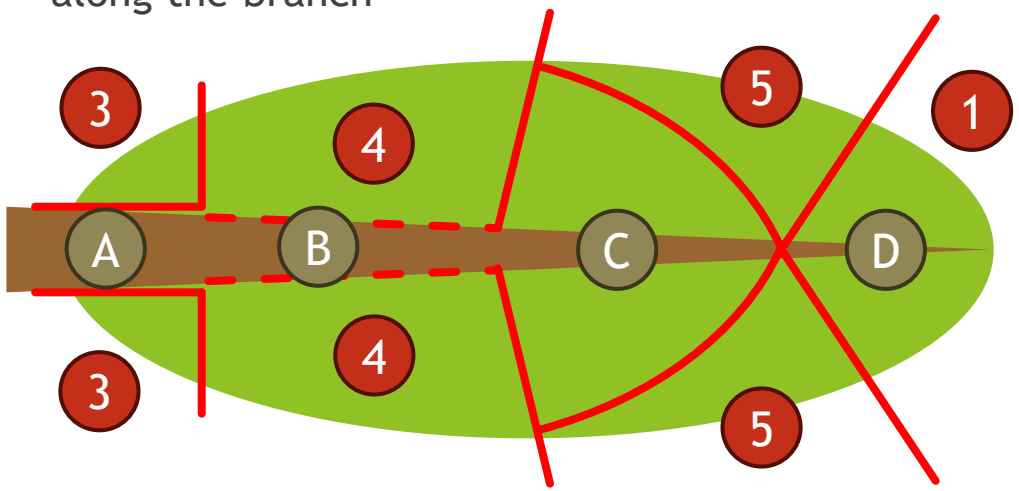
- No epicormic growth
- Lateral growth is already present!
- Short inter-node distance
- Spiky foliage = immature scaly foliage

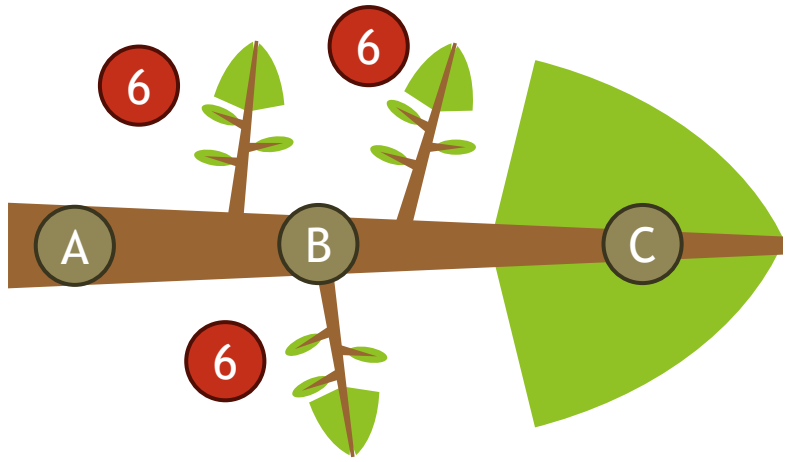
Goals

- Green growth should form pads or layers along the branch
- Branches should form fractal “fishbones”

Approach

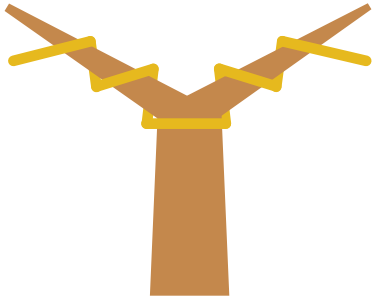
1. Remove branch tip (Zone D) entirely;
2. Remove growth out of the layer (i.e. up or down if branch is horizontal)
3. Remove growth in Zone A;
4. Thin out growth in Zone B;
5. Shape-prune growth in Zone C
6. …Then repeat for each branch in Zone B

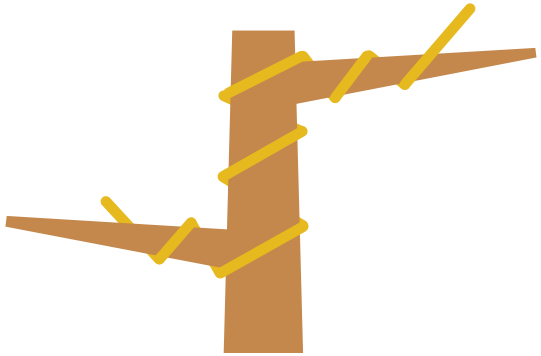




Wiring

The ~~rules~~ guidelines





Goals

- Imitate the effect of gravity on full-size tree branches ("square-cube law")
- Make straight branches look like they're the product of many shorter segments
- Spread branches to avoid shading each other
- Fill unwanted gaps in the canopy
- For conifers: bring foliage closer to trunk

Approach

1. If it's daft and it works, it's not daft
   - We use anodised aluminium wire because it is easy and attractive. Weights, strings, corks, rubber bands, etc are all completely valid alternatives!
2. Use the thinnest gauge of wire that will still bend the branch
   - E.g. if either 2mm and 1.5mm would work, but 1mm wouldn't, use 1.5mm
3. Always wire two branches together!
   - …Or wire a branch to the trunk, or the trunk to the root ball / pot; just don't try to wire a single branch on its own
4. Wire at 45° to the branch / trunk
   - Rule of thumb: the wire needs to be the length of branch / trunk to be wired × 1.5
5. The wire is a *cage* not a *corset*
   - I.e. use as little pressure as possible: the less it digs in on Day 1, the longer you have before it leaves wire-marks on the bark
   - It's OK to leave an "open coil" spiral at the end to gently control green growth
6. Leave wire on for one growth season
   - Usually 6 months – covering either Spring or Lammas growth - except for some mountain pines which only have one growth flush per year
   - If the branch hasn't "set" after one flush, you just have to reapply the wire

Stress Management

…No, I meant for the *tree*

Sources of water stress

- Root pruning
- Under-watering
- Over-watering / poor drainage → root rot
- Over-fertilising
- Summer

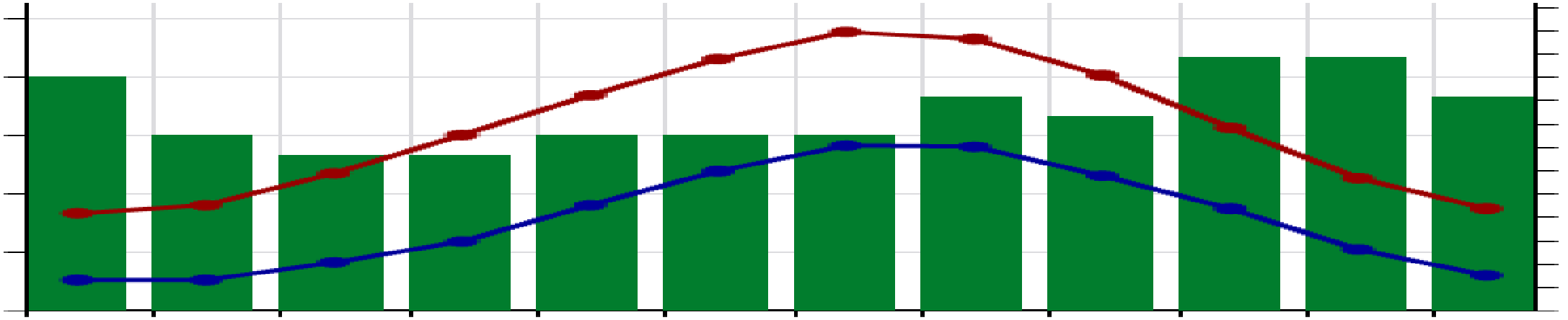
Sources of wood stress

- Heavy removal of green growth
- Branch removal past the “collar”
- Some kinds of deadwood work
- Insect attacks

- It’s best to space stresses out over as much time as possible – e.g. 1 major stress per tree per growth season
- Water stress and wood stress are not (necessarily) additive: if you prune the foliage *and* the root ball, there is less demand for water so less work for the remaining roots

There Is A Season

When to do what



Winter	Spring*	Summer	Autumn
Dormancy • Light watering • ~~Frost protection~~** • Cleaning & tidying • Stock up on growth media	Spring growth • Moderate watering • Moderate fertilising • Pest control & weeding • Re-potting (every 1-3 years) • Structural pruning if needed • Wiring / wire removal	Sun & heat • Heavy watering*** • Very light fertilising • Enough shade (species dependent)	Lammas growth • Moderate watering • Mild fertilizing • Pest control & weeding • Pruning for ramification • Wiring / wire removal

* Spring for bonsai practitioners (especially in London) typically starts earlier than the calendar date
** Not usually needed in present-day London due to the heat island effect and global warming
*** If going on holiday, put bonsai in bath with enough water to just barely touching the soil through the pot drainage holes

Next Steps

Becoming a Bonsai Practitioner

Practice, Practice, Practice

Practice, practice, practice, practice… you get the picture

1. Keep your tree alive and bonsai-ish
   - Remember: WATERING!!!
   - Remove wire in ~6 months
2. Find rogue seedlings to “adopt”, and transfer them to pots
   - …*Without* killing them, I mean
   - Once you’re sure they won’t die, prune them and gradually move them to smaller / shallower pots
3. Start to build a bonsai toolkit
   - Start with cheap / improvised tools: chopsticks, pliers, wire-cutters, tamper, nail scissors
   - Consider buying: root shears, straight-edged branch cutter
4. Build a collection of pots for all bonsai styles and phases of development
   - Make your own – e.g. with crockery and a diamond tile hole saw
5. Contemplate trees in nature
   - What principles do they reflect, and how did they get that way?

Learn From Others
Apart from yours truly

1. Buy a book
   - I like the DK Bonsai book: https://www.dk.com/uk/book/9781409344087-bonsai/
2. UK Bonsai Association: https://www.ukbonsaiassoc.org
3. Local clubs
   - Currently none in central London, but several out in the suburbs
   - The UKBA site has a very complete list (albeit not the easiest to search)
4. Bonsai shows and car boot sales
   - Again: the UKBA has a calendar
   - Again: none in central London, but some in Twickenham, Bracknell, Kent…
5. Youtube
   - Channels: Mă-Kè Bonsai, Herons Bonsai, Bonsaify, Notion Bonsai, Bonsai Empire, …
6. Drop me an email! alex@nemeta.co.uk

Thanks For Attending!

Appendices

Miscellaneous Technical Notes

How Often To Water
Some key factors

Pot

- Depth: deep → less frequent
- Shape: bulbous → less, fluting → more
- Inner surface: glazed → more

Soil

- Drainage: well-draining → more
- Degradation: older → harder to water
- Dressing: dead sphagnum and/or live moss covering → harder to water but less frequent

Tree

- Maturity: older → less (in theory)
- Fertilisation: heavy → more
- Re-potting: recent → more

Environment

- Wind: windier → more
- Sun: sunny → more, shady → less
- Heat: hotter → more, colder → less
- Season: Winter = least, Summer = most
- Warning: these factors are "non-linear"! A small increase in e.g. sun can mean a big increase in watering.

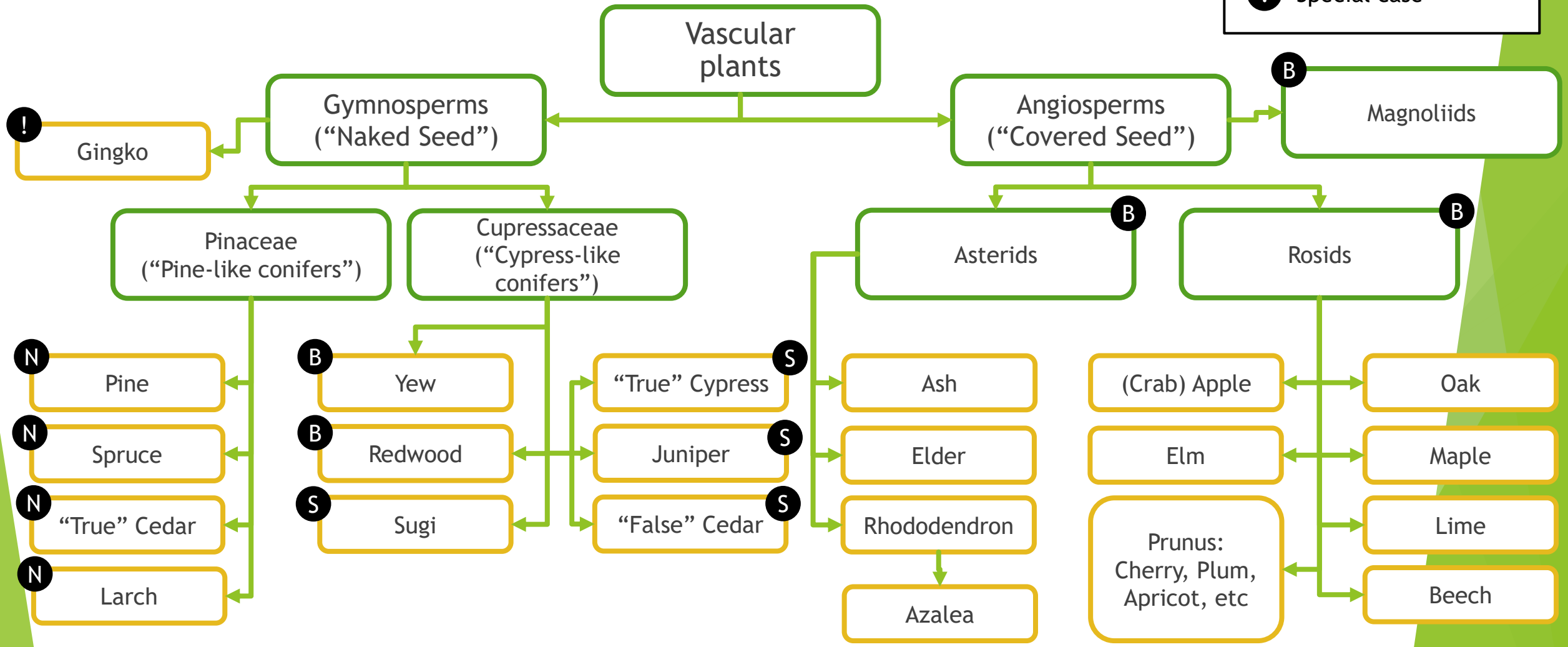
…Mostly it's not worth the effort to figure out the "right" watering frequency. Just keep checking the pot every day!

Woody Plants: A Family Tree

Evolution From A Bonsai Pruner's Perspective

Prune as:

- B Broadleaf
- N Needley conifer
- S Spiky / scaly conifer
- ! Special case

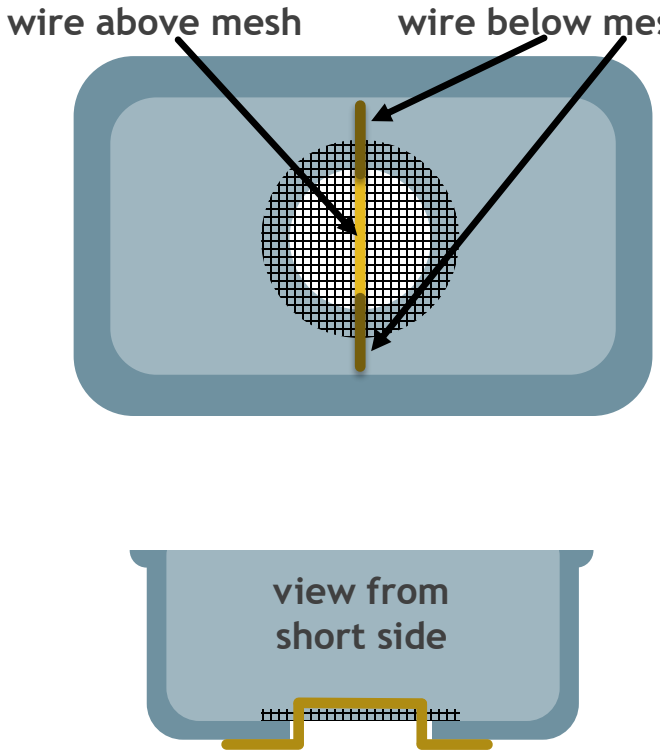


Wiring a Bonsai Pot

What could go wrong?

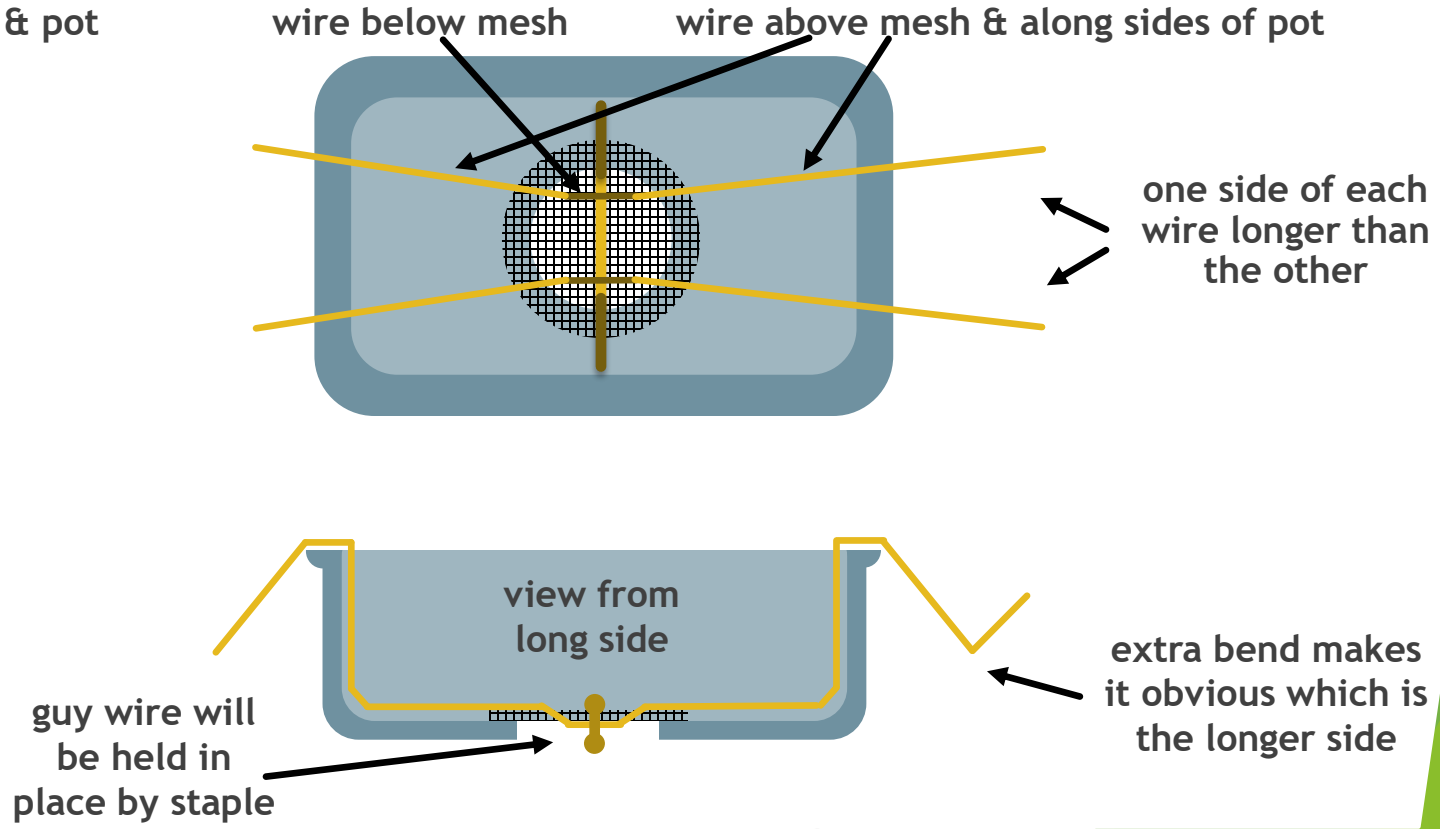
Mesh & Staple

(Plastic mesh, 2mm alum. wire)

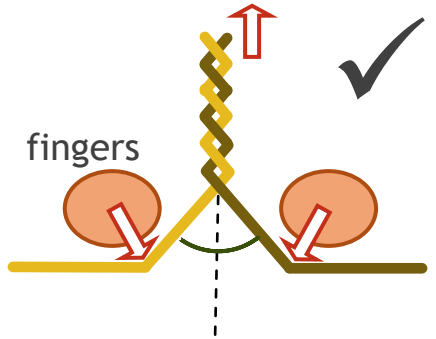


Guy wires

(1.5mm alum. wire x 2)



Repotting step-by-step



Regular repotting – often back into the same pot! - helps limit tree size via “root-to-shoot ratio”

1. Prepare pot

- Pick a (tentative) pot
- Scrub clean
- Staple mesh over holes
- Add guy wires

2. Prepare tree

- Remove from pot
- Clean off soil surface
- Dig down to expose nebari
- Choose “front” if not already clear
- Dig up / in to define root-ball
- Untangle lateral roots where poss. (esp. girdling roots)
- Clear any growth from lower trunk
- Spray with water if starting to dry!

3. Insert tree into pot

- Add shallow layer of soil to base
- Place root ball in pot and pack soil around
- Compress soil to “brownie” hardness
- Pull guy wires over root ball, twist pairs together tightly, and trim to 3-4 twists
- Cover with dried, grated, rehydrated sphagnum and compress surface
- Sprinkle with grated acrocarpous (upward-growing) moss