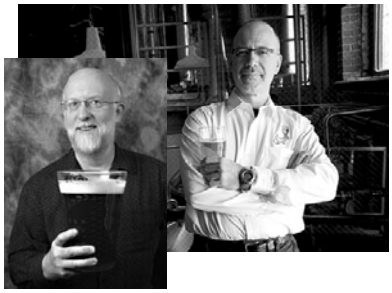
Randy Sez; Ray Sez!



Recipe Formulation: Art

- **As an artist, it's your job to mess with people' heads!**

Recipe Formulation: Art

- **No Scientific definition of good beer**
- **Miller Lite same as Bigfoot**
  - (Maybe better)
- **Personal**
- **Societal**
- ***Subjective***

Recipe Formulation: Art

- **Why are you brewing?**
  - Amaze people
  - Brew something authentic
  - Historical research
  - Self-pleasuring
  - Express creativity
  - Win competitions

Recipe Formulation: Art

- **Science serves the ART of brewing**
  - Elimination of "flaws"
  - Economy
  - Consistency
  - Predictability

Recipe Formulation: Art

- **Art has methods, logic, a science**
  - Beyond brewing by the numbers
  - Beyond just hitting the style
- **Best beers have something else**

Recipe Formulation: Art

- **Best beers show artistry!**
  - Personality
  - Synergy
  - Memorability
  - Depth
  - That certain something

Recipe Formulation: Art

- **Aesthetic principles that apply to all arts**
- **The ability to touch people**
  - Beyond brewing by the numbers
  - Beyond just hitting the style
  - Wonderfulness

Recipe Formulation: Art

- **Unity, harmony—the *Big Idea***
  - All elements in composition work towards artistic goal
- **Relentless level of craft**
  - Freedom from distractions, flaws
  - Attention to detail
  - Little things add up

Recipe Formulation: Art

- **Tension/balance**
  - Two sides of same coin
  - Makes use of contrasting, oppositional elements
    - Hop/malt
    - Acidity/sweetness
    - Sweet malt vs. roasty, toasty

Recipe Formulation: Art

- **Tension/balance**
  - Usually 2-way, can be 3-way:Malty, hoppy, toasty
  - May be more w/acidity, fruit, smoke, etc.
  - Maintains interest—“drama” that plays out fresh every time

Recipe Formulation: Art

- **Depth/complexity**
  - That unique twist—surprise people!
  - Threshold as well as sub-threshold levels
  - Don’t use paint right out of the tube
  - Layering
    - Similar flavors added together
    - Different ingredients with similar qualities

Recipe Formulation: Art

- **Relevance to audience right now**
  - Timid or avant garde
  - Hophead homebrewers
  - Or: “What’s your lightest beer?”
- **Push them a little**
  - It’s your duty as an artist!
  - What will surprise, delight?

Recipe Formulation: Art

- **Discretion & economy**
  - Finish it, then take one thing away
  - Don’t be afraid to understate things
  - Exuberance a good thing, but
    - Such a thing as *too* much
    - Bitterness, maltiness, alcohol
    - Spicing

Recipe Formulation: Art

- **Consider the arted**
- **Hardware: physiology**
  - Taste, aroma mouthfeel
  - Visual presentation very important
- **Software: psychology**
  - We are not always in charge
  - Emotional memory=leverage
  - Expectations are key

Recipe Formulation: Art

- **Aroma and the brain**
  - **Ability to stimulate powerful psychological responses**
    - Memories, emotions
    - Incredible leverage for art…
    - But uncontrollable
  - **Appetite and expectations**
    - Personal
    - Cultural
    - Universal

Recipe Formulation: Art

- **Non-linearity**
  - Matrix flavors
  - Sub-threshold flavors
  - Masking
    - One chemical covers another
    - Vanilla covers up off-aromas
    - High hop rate masks oxidation
    - High carbonation masks hops

Recipe Formulation: Art

- **Know your ingredients**
- **More variation than you think**
- **Don’t assume anything**
- **Taste, taste, taste!**
- **Understand the chemistry**

Recipe Formulation: Art

- **Think of process like an ingredient**
- **Adds flavor, texture, aroma**
- **Time, temperature, technique**
- **Make sure it all works together**

Recipe Formulation: Art

- **Style & expectations**
  - Styles can be useful shorthand
  - People drink with their eyes and ears, too
    - Fire brewed, sky blue waters, beechwood aged
  - Shorthand for more complex ideas, emotions & memories
  - People want help about how to think about your beer

Recipe Formulation: Art

- **Style alone not enough**
- **Have an idea, a BIG idea**
- **A concise description:**
  - "A pale beer with lots of personality"
  - "The richest porter in the universe"
  - "The creamiest cream ale"
  - "The brownest-tasting brown ale"

Recipe Formulation: Art

- **Ideas: Inspiration is all around you**
  - Old world brewing traditions
  - American brewing history
  - Local/regional history
  - Cuisine
  - Ethnic origins
  - Other creative brewers
  - Other beverages

Recipe Formulation: Art

- **Ideas**: **Bridging**
  - Applies attributes from one category to another
  - Gingerbread ale, white chocolate mousse (desserts)
  - Chai, ginseng beer (tea/botanicals)
  - Barrel-finished beer (spirits)
  - Maple buckwheat ale (breakfast)

Recipe Formulation: Art

- **Ideas**: Amplification
  - Cranks up the volume on a particular quality
  - "Hyper hoppy" beers
  - "Super" fruit beers
  - Quadrupel bocks & abbey beers
  - Other high-alcohol beers

Recipe Formulation: Art

- **Ideas**: Historical fantasy
  - Takes historical nugget, uses in new way
  - Peat-smoked Scottish ale
  - Wassail holiday ale
  - "Pirate" stout
  - Indian popcorn ale
  - Southern sorghum beer

Recipe Formulation: Art

- **Ideas:** Ingredients
  - Focuses on unusual ingredient
  - Red rice pink pils
  - Cocoa porter
  - Toffee ale
  - Huckleberry ale
  - Espresso stout

Recipe Formulation: Art

- **Ideas**: bending the rules
  - The familiar thing, but with a twist
  - Honey wheat
  - Amber witbier
  - Abbey weizen
  - Porterweisse

Recipe Formulation: Art

- **What are you trying to say?**
- **How do you want people to feel?**
- **Taste it in your head; virtual beer**
- **Everything works towards the idea**
  - Recipe, process, yeast, etc.
  - Edit! Not every trick in every beer
  - A purpose to every element

Recipe Formulation: Art

- **Make it memorable!**

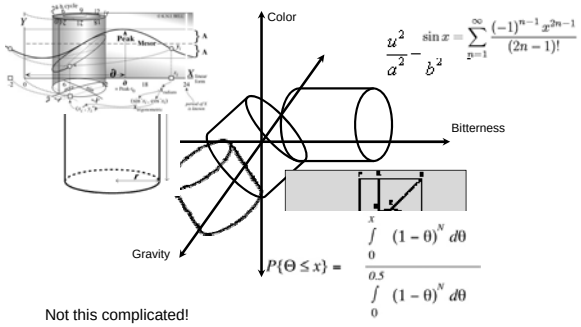
Recipe Formulation:

Science!

Recipe Formulation: Science

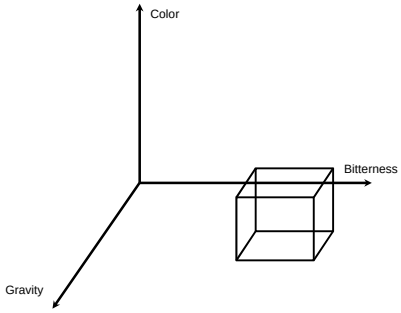
- **Put a stake in the ground!**
- **Say it with numbers!**
- **Forget how you feel!**
- **Put it in the box!**

Recipe Formulation: Science



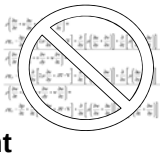
Not this complicated!

Recipe Formulation: Science



See how easy this is now?

Recipe Formulation: Science



- **It's (mostly) linear**
- **No trig or calculus!**
- **We deal with each component individually**
- **Few interactions**
  - **(Shhh! Intuition might play a role.)**

Recipe Formulation: Science

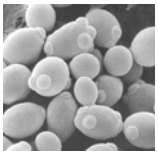
- **What do we have to decide:**
  - **Original Gravity**
  - **Bitterness**
  - **General Color**
- **Will that do it?**

Recipe Formulation: Science

- **Also consider qualitative aspects:**
  - **Malt character (drives color)**
  - **Hop flavor and aroma**
  - **Mouthfeel**

Recipe Formulation: Science

- A couple more things:
  - Mash chemistry (water & calcium)
  - Fermentation plan (yeast, temp, time)
  - Carbonation, packaging



Recipe Formulation: Science

- How do you decide?
  - Steal!
  - BJCP Guidelines
  - Designing Great Beers

Recipe Formulation: Science

- That "Vision" Thing
  - Belgian IPA
  - Tomme Arthur's Mild
  - Stout made with wheat
  - Helles meets Mango
  - "Session" Bock

Recipe Formulation: Science

- Describe in 6 words or less
- Often base quants on classic styles
- Adjust character of malts, hops, yeast

Define Your Beer in Six Words

Recipe Formulation: Science

- Hops
  - Life can be easier w/ metric system
    - 1 IBU = 1 mg/L
  - Flavor & aroma more art

Recipe Formulation: Science

- Hops
  - Determine aroma & flavor additions
    - Based on practice
    - No way to quantitate
- Determine IBU contributions
- Calculate bitter hops needed to hit IBU target

Recipe Formulation: Science

Malt calcs:

- **At the mercy of our supplies**
- **Potential extract drives malt quantities**
  - **Different for every malt**
  - **Different between batches, yrs, etc.**

Recipe Formulation: Science

Malt calcs:

- **At mercy of our process**
- **Brewhouse efficiency**
  - **Malt properties**
  - **Grind**
  - **Mash & lauter technique**
  - **Equipment losses**

Recipe Formulation: Science

Malt calcs:

- **Standard calculations**
- **Variable results**
- **Need to compensate**

Recipe Formulation: Science

- **Hitting Target Gravity**
- **Defines the beer**
- **Essential to balance**

Recipe Formulation: Science

- **Measure gravity of runoff**
- **Assess expected OG of wort**
- **Must measure volumes accurately**
- **Correct OG reading for temperature**

Recipe Formulation: Science

Recipe Formulation: Science

Recipe Formulation: Science

- Collect all wort from mash
  - Measure volume
  - Measure OG & temperature
- Example:
  - 6 gallons
  - 1.018 (!)
  - 150° F

Recipe Formulation: Science

- Correct OG reading for temp

Degrees F	Adjustment
100	Add .005
110	Add .007
120	Add .008
130	Add .010
140	Add .013
150	Add .015

1.018 becomes 1.033

Recipe Formulation: Science

- Convert OG to Gravity Units
- OG to GUs: 1.033 = 33
- Multiply GUs x volume
  - 6 gallons x 33 GU = 198 Total

Recipe Formulation: Science

- 198 Total GUs
- Want 5 gallons finished
- What will final gravity be?
- 198 / 5 = 40 or ~1.040

Recipe Formulation: Science

- 198 Total Gus : 1.040 expect OG
- Goal was 1.045
- What could we do?
  - Boil to lower volume
  - Add malt extract

Recipe Formulation: Science

- 198 Total Gus : Want 1.045
- Divide 198 by 45 = 4.4 gallons

Recipe Formulation: Science

- Have 198 Total GUs
- Want 5 gallons of 1.045
- 5 x 45 = 225 total GUs
- Need 225-198 or 27 GUs of extract
- 1 lb DME = 45 GUs
- 27/45 = 0.6 lb of extract needed

Recipe Formulation: Science

Water
- One size does NOT fit all
- Adjust
  - Your water
  - Your recipe
- Still, not that complicated

Recipe Formulation: Science

Water
- Two profiles
  - Pale / hoppy beers
  - Dark / malty beers

Recipe Formulation: Science

Water: Pale / hoppy beers
- Minimize CaCO3 (alkalinity)
- <75 ppm required
- <50 ppm desired
  - Cut with distilled or RO water
  - Acid treatment

Recipe Formulation: Science

Water: Pale / hoppy beers
- For calcium additions use CaSO4

Recipe Formulation: Science

Water: dark/malty beers

- **Dark grains are acidic**
- **Neutralize alkalinity (CaCO3)**
- **Use CaCl2 for calcium additions**

Recipe Formulation: Science

Water: final caveats

- **Mash water should be the same as sparge water**
- **Malt + pH 7 water = pH 5.8 mash**
- **Don't over acidify!**

Recipe Formulation