



Wine Quality from a Sensory and Chemical Point of View

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July 2016: Dept. of Food Science, Penn State

What is quality?

“... I shall not today attempt further to define the kinds of material But I know it when I see it,”

Justice Stewart, *Jacobellis vs. Ohio*, 378 U.S. 184

- Multi-faceted
- Highly subjective

⇒ perceived quality

Perceived quality

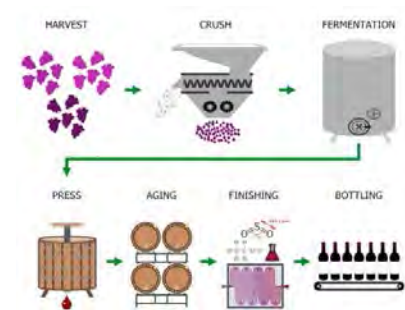
integrates individual perception, past experiences, and expectations

extrinsic factors

- technical correctness
- viticulture
- enology
- free of faults
- drinkability

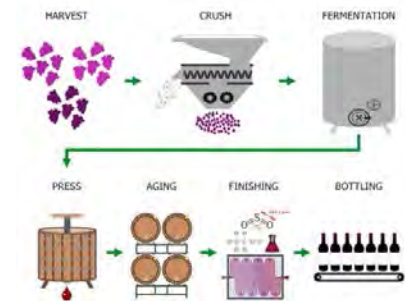
intrinsic factors

- drinking experience
- flavor and mouthfeel
- appearance
- geographical origin
- typicality & potential

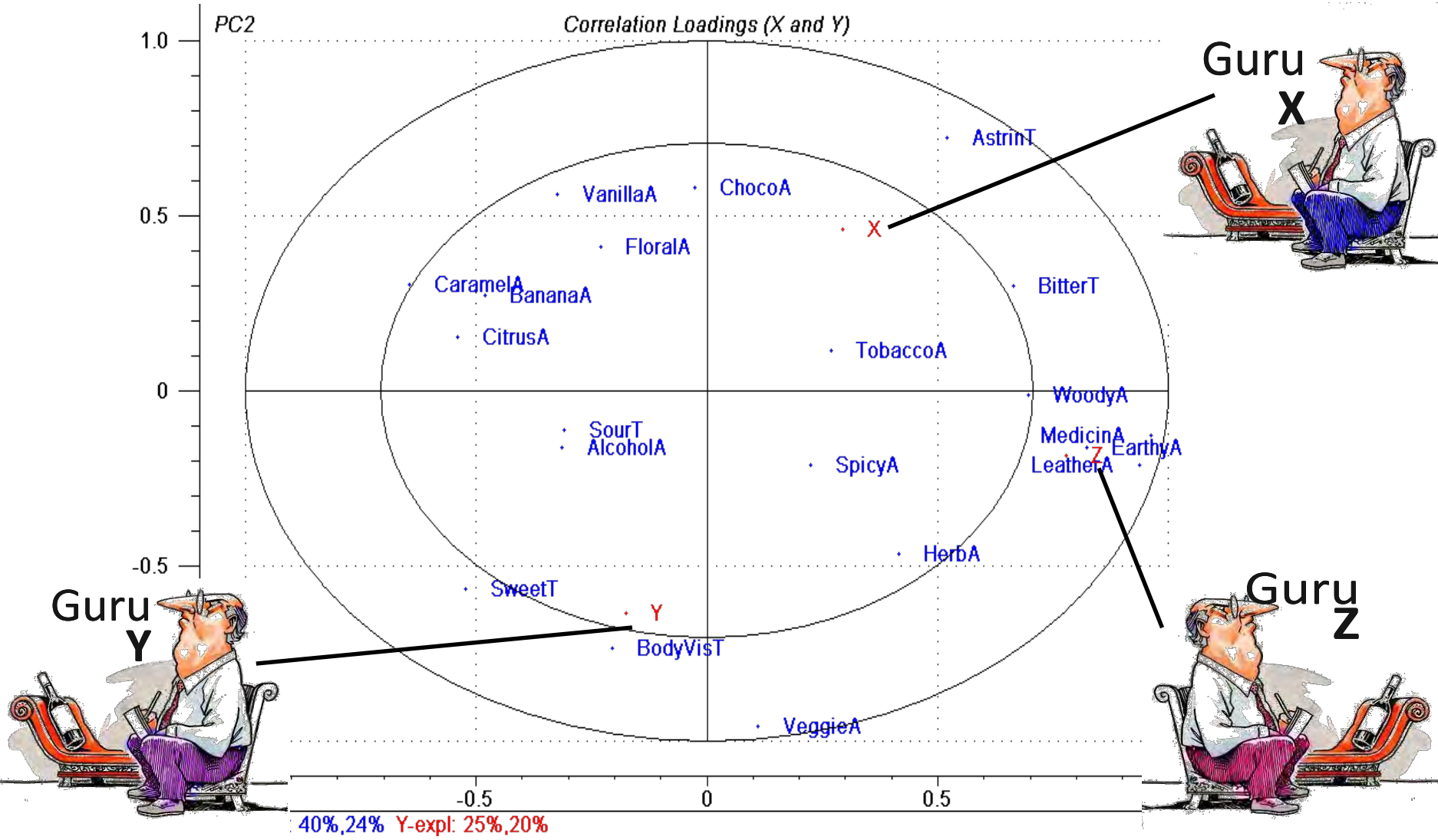


Different proxies of Wine Quality

- Wine competition awards
- Wine expert scores
- Retail price
- Geographical origin



Wine gurus prefer certain sensory attributes



Judging wine quality – who to ask?

- 27 Cab. Sauv. wines
- From 9 regions
 - 1 G or DG ... high quality
 - 1 S or B ... medium quality
 - 1 NA ... low quality

Analyses

- Trained panel
- Wine experts
- Wine consumers
- Chemical measurements
 - Elemental fingerprint
 - Volatile fingerprint



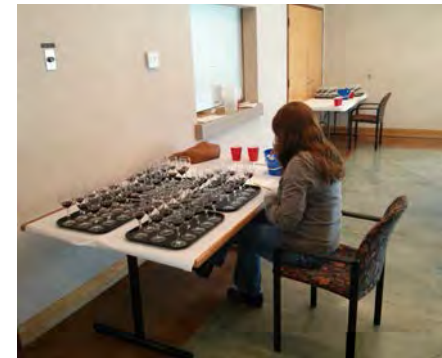
Sensory Fingerprint of each wine

- 15 trained panelists
- Triplicate assessment
- 21 aroma, 3 taste, 3 mouthfeel terms



Quality evaluation of each wine

- 28 wine experts
- Perceived quality & liking

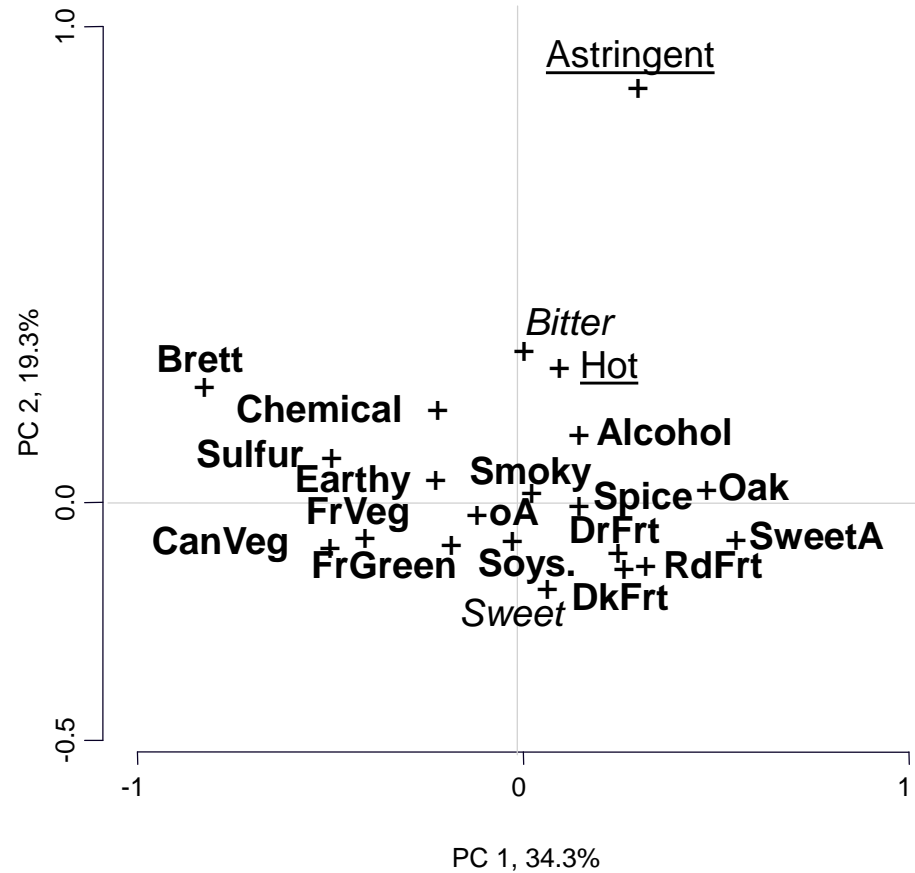
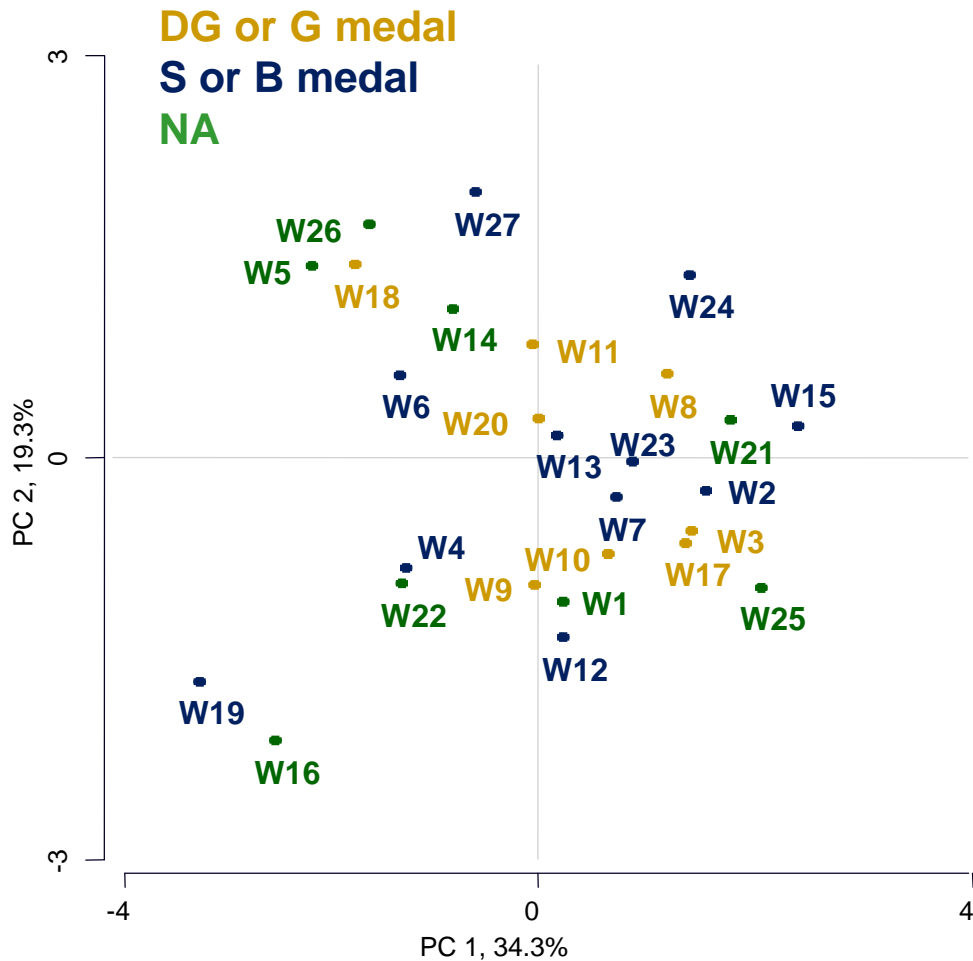


Liking scores

- 174 red wine consumers
- Perceived quality & liking
- Wine expertise quiz



Sensory Fingerprint

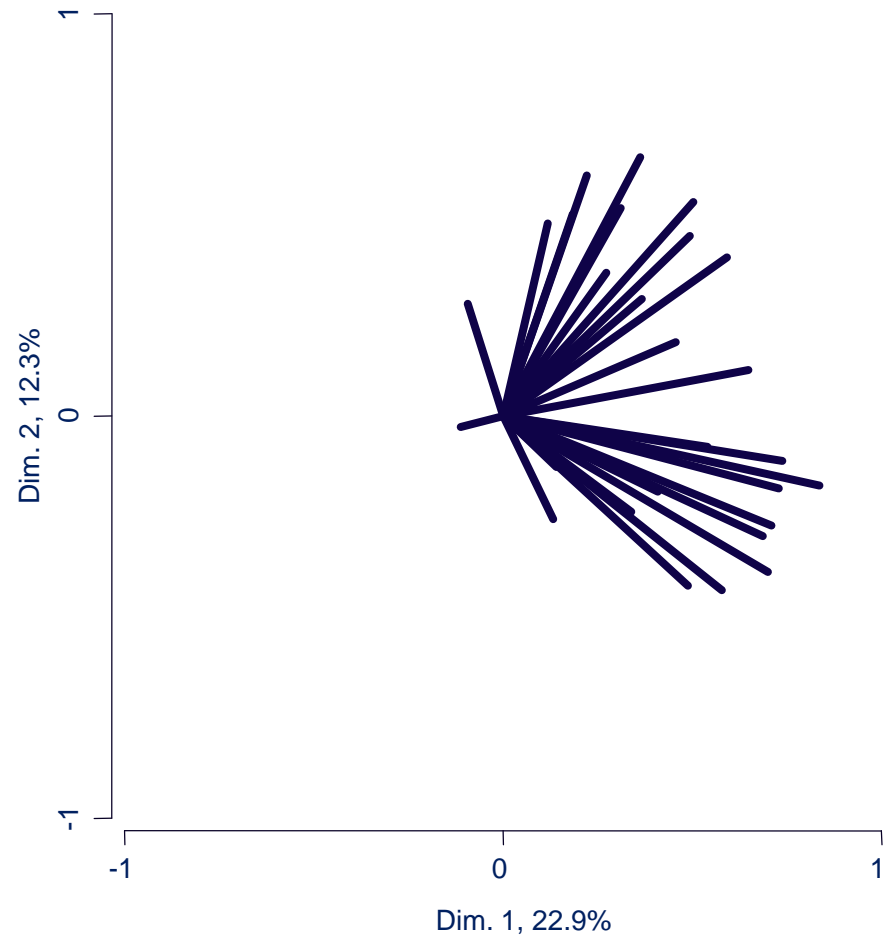
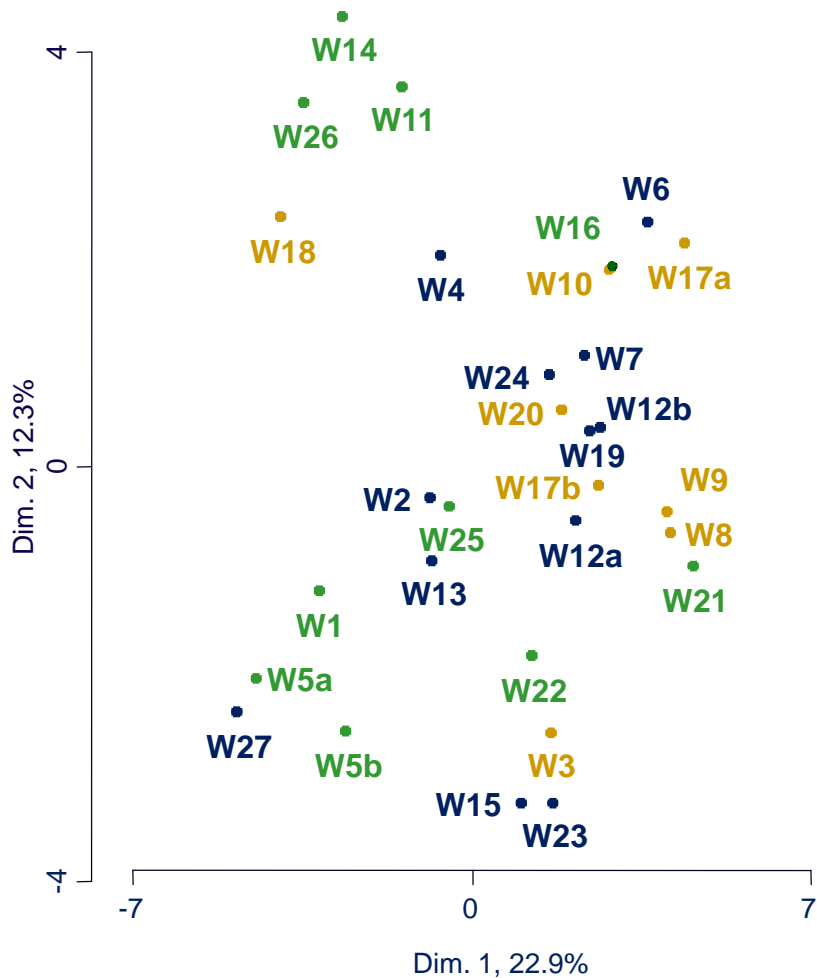


Internal Preference map of experts

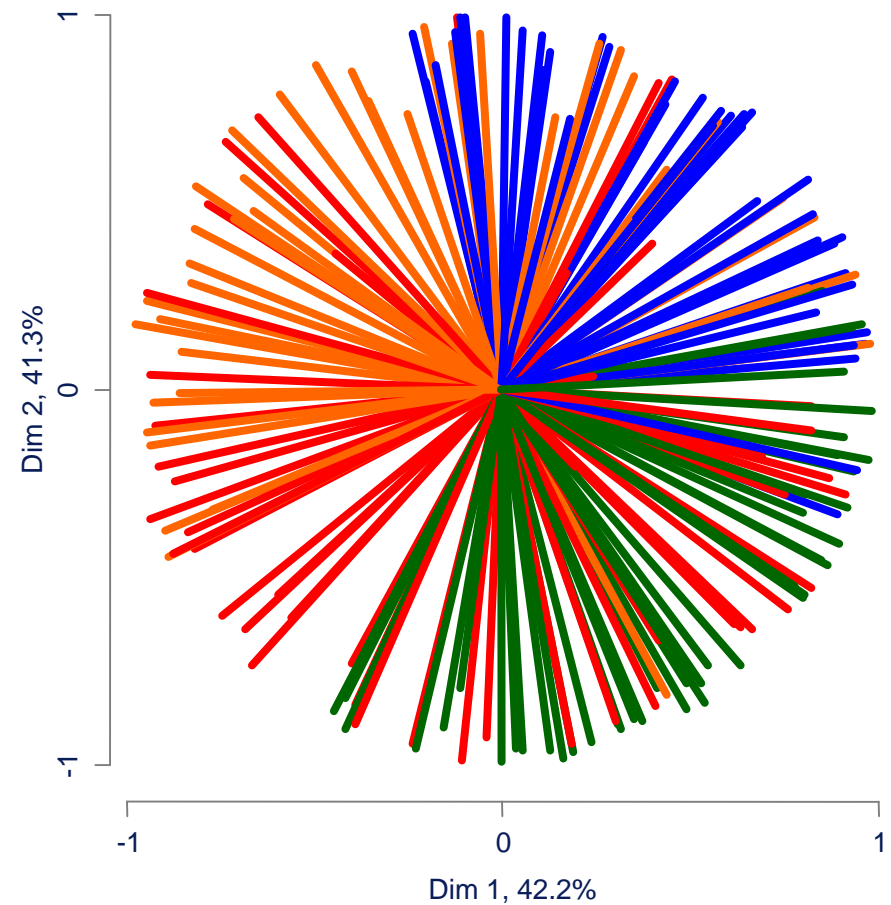
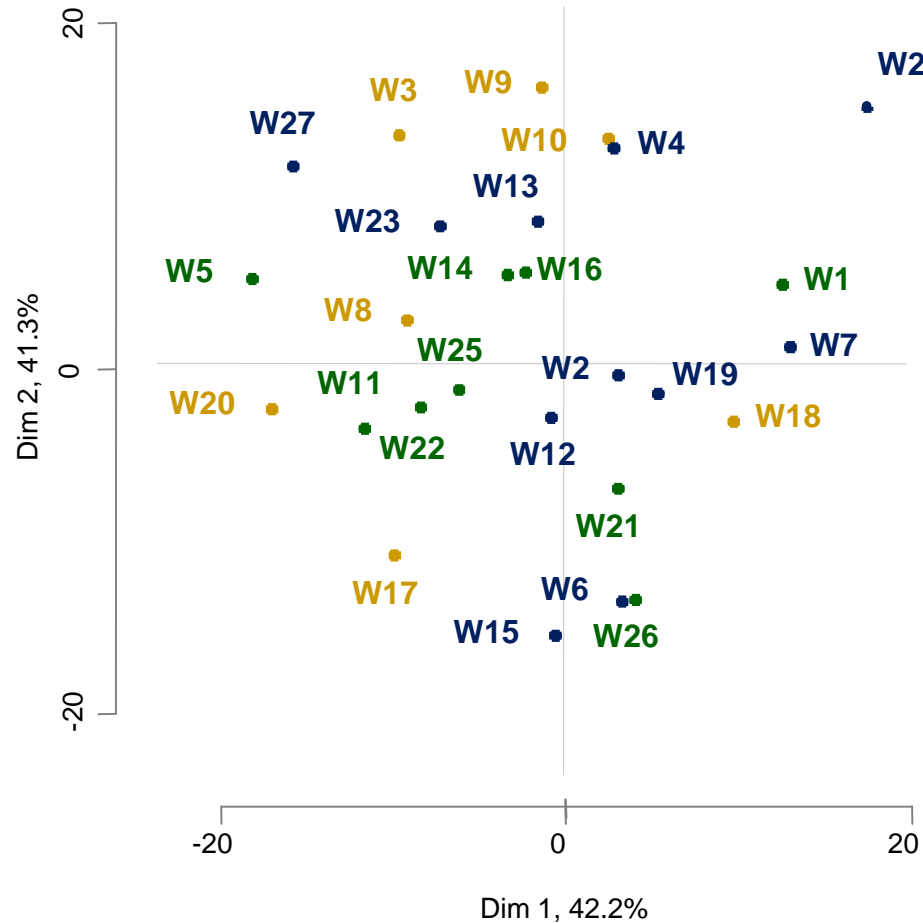
DG or G medal

S or B medal

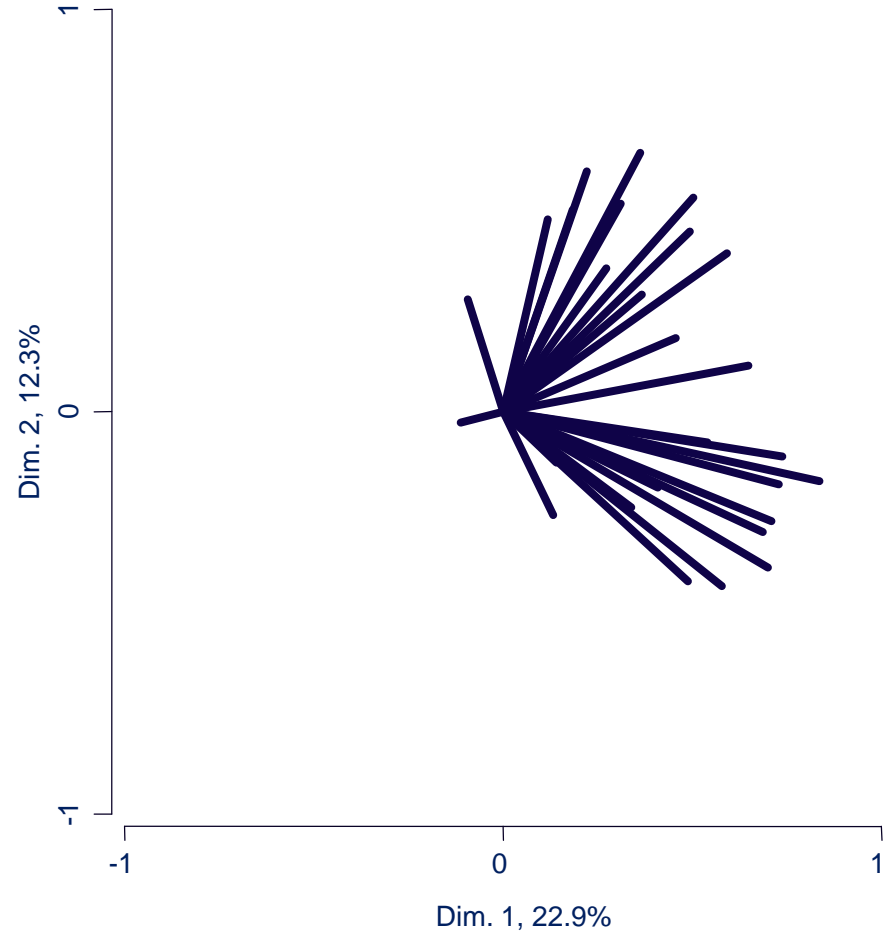
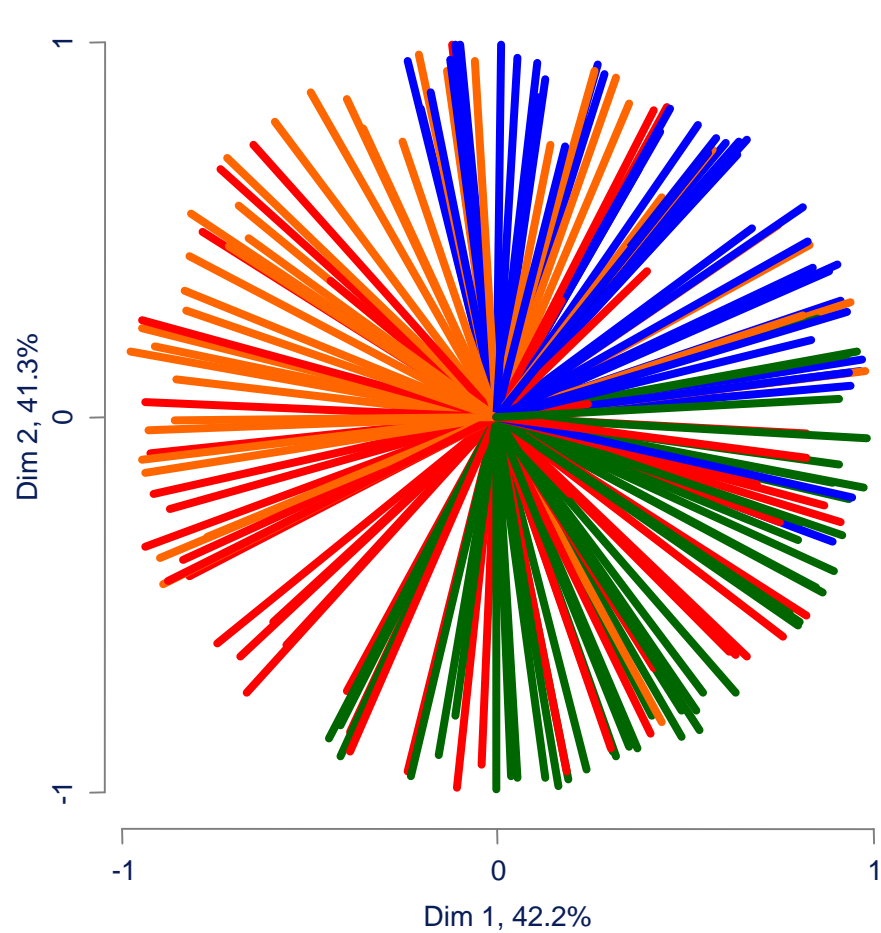
NA



Internal Preference map of consumers



Wine consumers vs. Wine experts



Correlations with quality proxies

Retail price

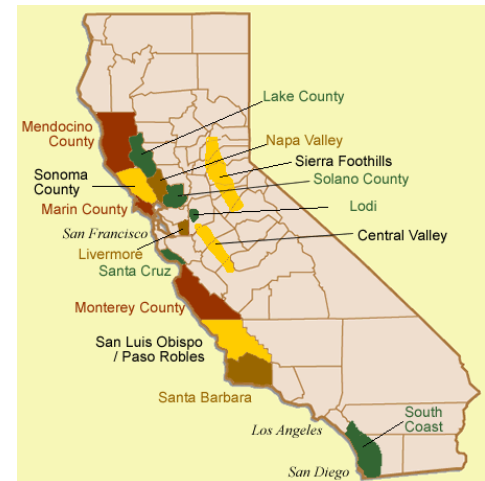
- + Alcohol aroma, Brett aroma, hot MF, Astringency
- Floral aroma, red fruit aroma, liking of HL4

Expert scores

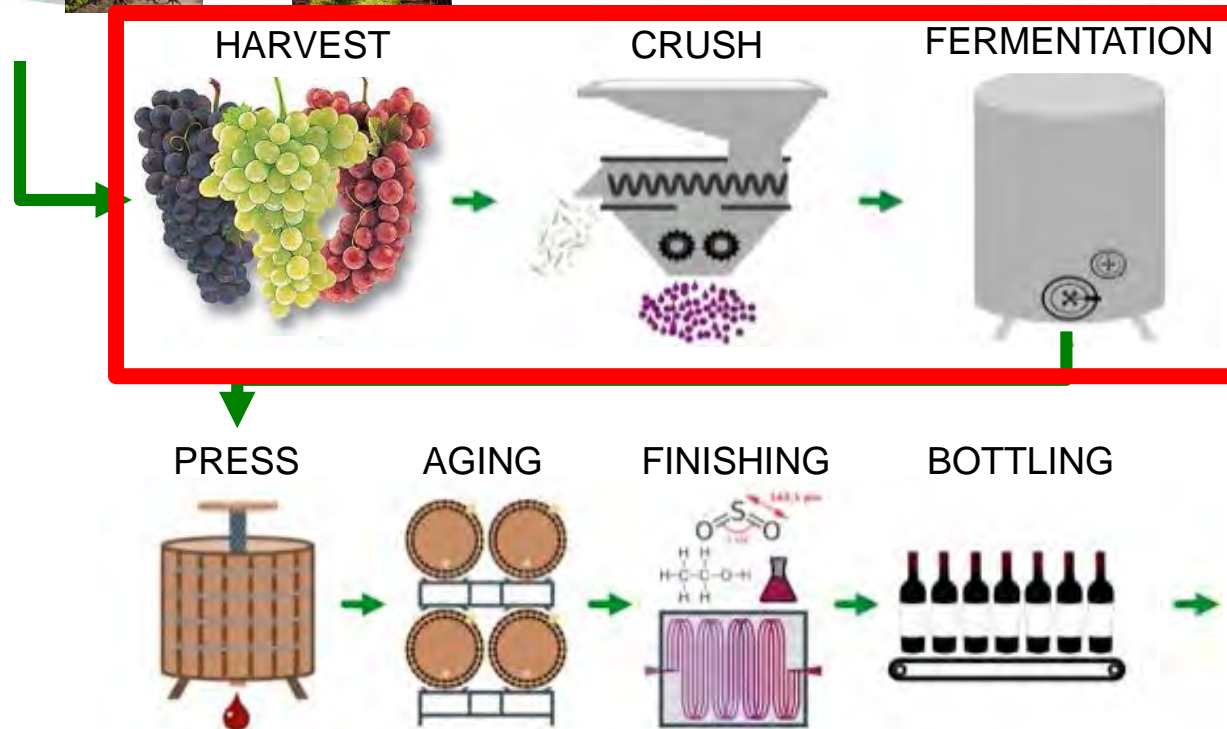
- + awarded points, red fruit aroma
- Soysauce aroma, fresh green aroma

Wine regions

- + sweet taste with Lodi
- + fresh green aroma with with coastal regions & Lodi

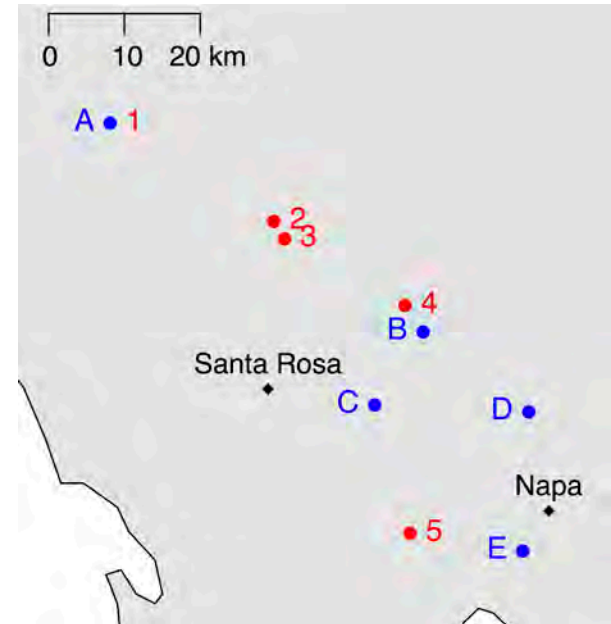


Processing impact on elemental fingerprint



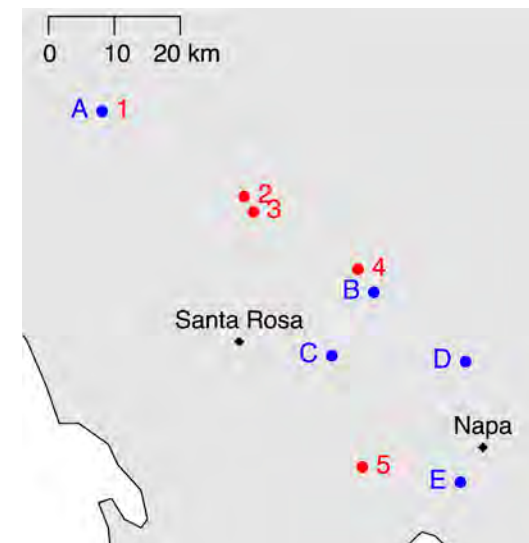
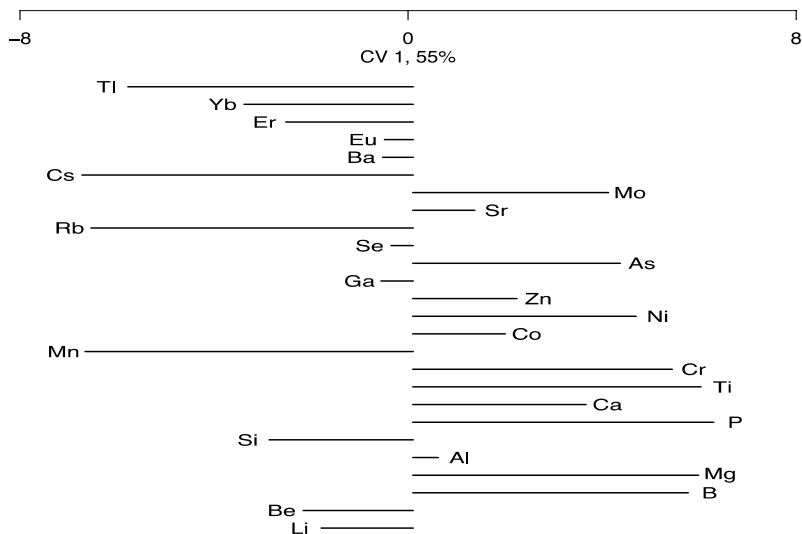
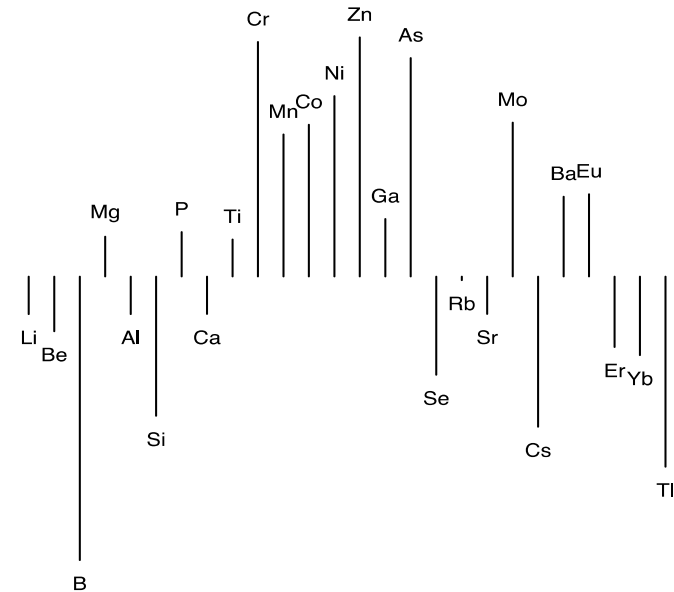
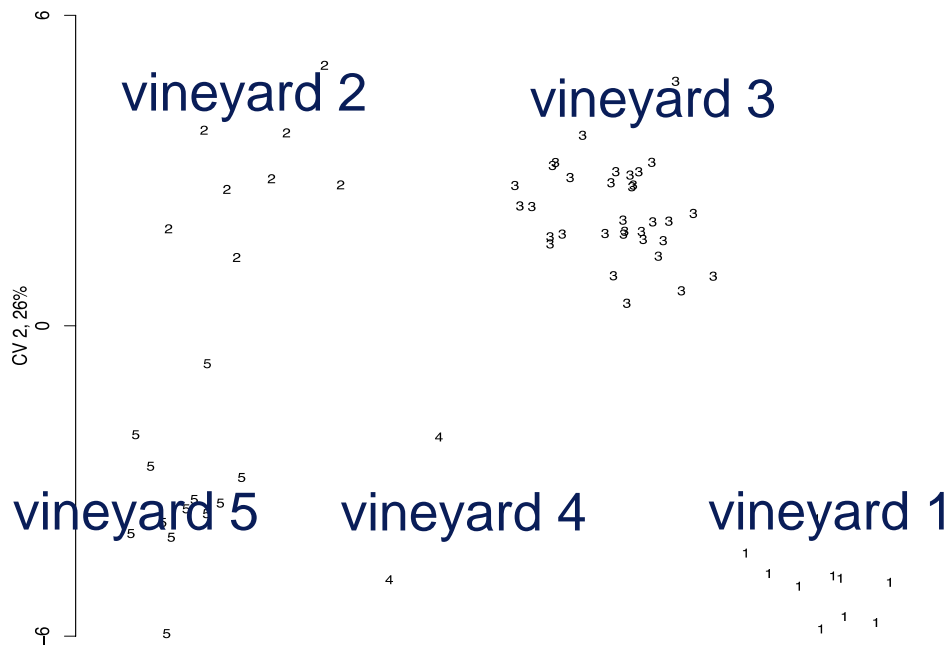
Processing impact on elemental profile

- 65 wines (Pinot Noir, Merlot & Cabernet Sauvignon), 2012 vintage
- 5 different vineyards (Napa & Sonoma)
- Processed in 5 wineries
- sampled as unfiltered, untreated monovarietals
- Elemental fingerprint of 63 trace elements with ICP-MS

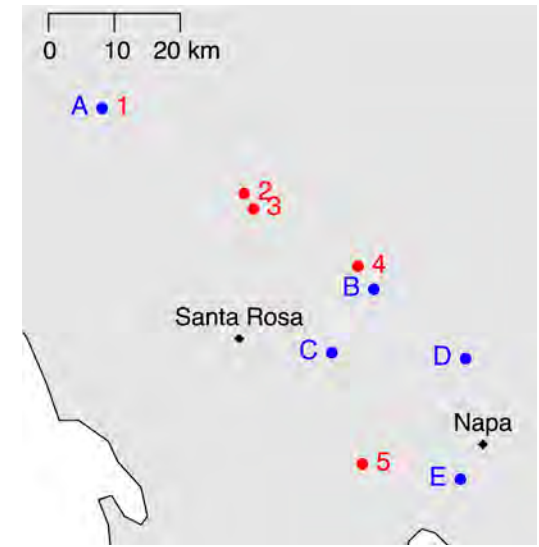
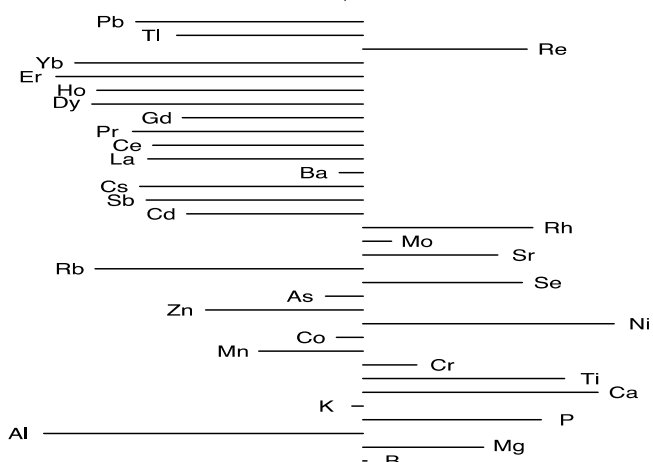
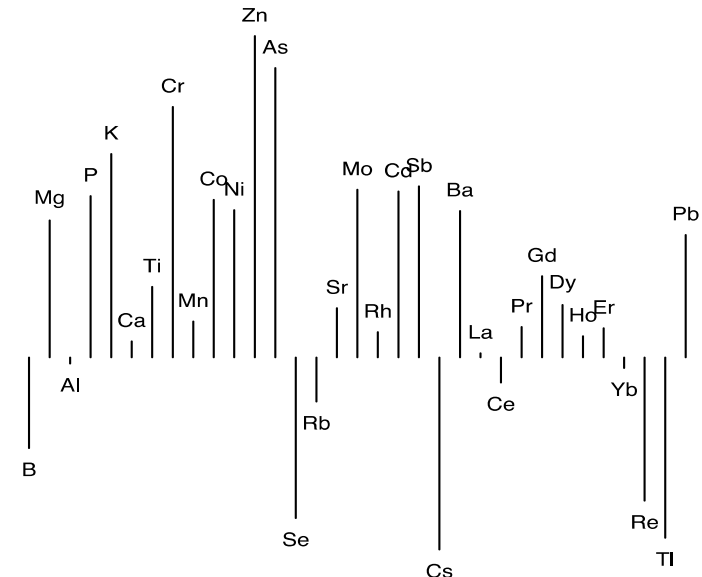
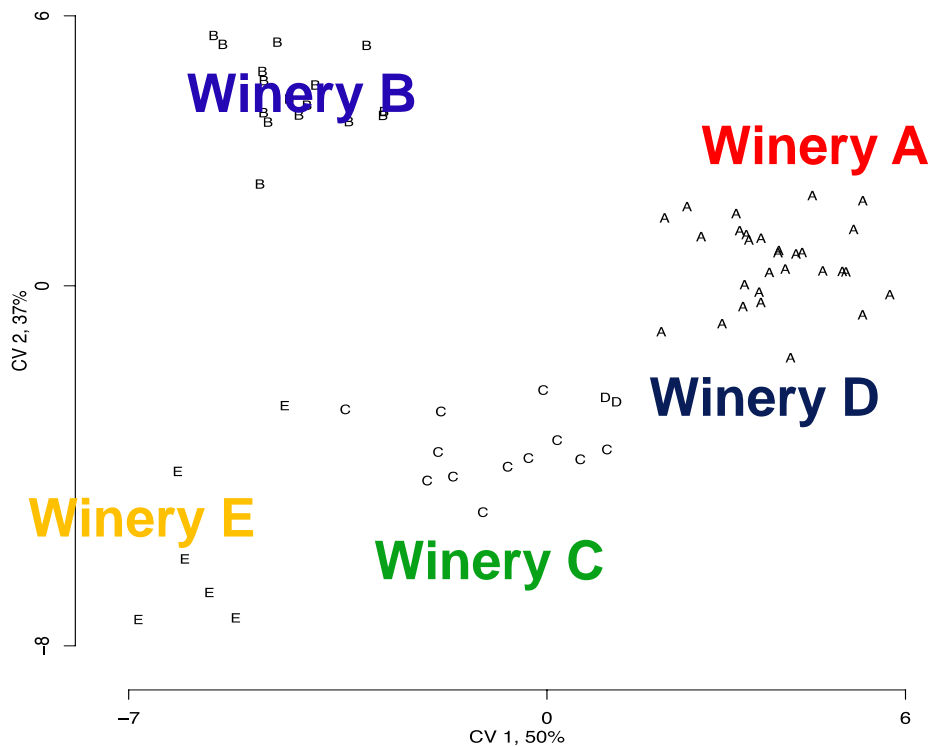


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Vineyard effect



Winery effect



Processing impact on elemental profile

- winery could “trump” vineyard and variety
- possible explanations
 - transport from vineyard to wineries
 - winery equipment (stainless steel tanks, pumps, ...)
 - additions (nutrients, ...)
 - fining and filtering (bentonite, filter materials, ...)
 - water (!)
- What is Origin ... vineyard or winery?

Summary

“... I shall not today attempt further to define the kinds of material But I know it when I see it,”

Justice Stewart, *Jacobellis vs. Ohio*, 378 U.S. 184

- Consumers and experts ... perceived quality ~ liking
- Experts are more aligned in perceived quality
- Quality proxies (retail price, expert scores, wine regions) can be tied to specific sensory attributes
- Chemical measurements of quality proxies provide additional information (e.g., elemental fingerprint)