Learning to smell – a pragmatist view on perception

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SENSATION Virtual Lecture Series

Thursday 17 November 2022

Geneviève Teil

INRAE - Agroparistech - Univ. Paris-Saclay

The issue

- A simple experiment
  - Take a sip of a beverage
  - You perceive: you do not need to learn it

➔ How can you *learn* to perceive something…

… that *happens* to you?

Smell and taste learning classes are…

- Just deceptions?
- Operating only on words?

→ A bit reductionist and simplistic

- Attending to classes
  - Expert apprenticeship
  - Naïve consumer sessions

Empirical analysis of training

1. The “first impression”
2. Generating uncertainty
3. Restabilizing smells
4. The field of odors™
5. Paying attention

1/5. Contrasting two tasting devices

- **Expert apprenticeship**
  - Normal classroom
  - Intense reworking of the olfaction
  - No interest for the “first impression”
- **Naïve panel**
  - Expert sensory lab
  - “You just taste as usual”
  - Preserving the “first impression”

Immediate perception, a fragile happening?

2/5. Learning to smell

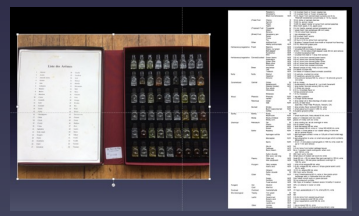
- Making experience uncertain
  - Casting doubt on pupils' perception
  - Questioning perception
- Change 'driven' – at best – by verbal autosuggestion
  - 'Aha-effect' restabilizing perception
  - Repeated cycles until finding teacher's 'solution' … or not!

3/5. Restabilizing smells

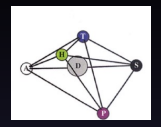
- Standardized lexicons
  - Lenoir's *Le nez du vin*

- Odor classes
  - Noble's Wine Wheel

- Odor references



4/5. JN Jaubert's Field of odours ™

- The odour kit
- Odorous 'poles' 
- 'Drawing' a continuous odorous space
  - Looking for the 'facets' of odours
- The Field of Odours© mapping

  - 2D
- Odour names
  - 3D

5/5. « Paying attention »

- What means “pay attention” to an odor?
  1. question perception, make it uncertain, look for its different facets…
  2. then, reconstruct it
  3. language, a crucial tool in both phases of this process
- Not a deterministic process

Back to perception

1. Accounting for the transformation fostered by learning
2. Extending smell to general perception
3. Perception and knowledge

1/3. Accounting for the change

- Learning
  - **Destabilizing** experience: Breaking with immediacy by generating uncertainty
  - **Restabilizing** experience: From uncertainty back to certainty and immediacy
- Pedagogical techniques
  - Controlling elusiveness: searching for hues - Use of words
  - Stabilizing perception = becoming as repeatable as possible – trying to match the map
  - Techniques are NOT deterministic *per se*
- A change in my smelling experience: the world smells 'more'
  - I am constantly questioning odours
- The 'body' interface and '*Being*-in-the-world'

2/3. From the smell to other feelings

- Extending the analysis to other senses
- To other emotions?
  - Raising doubts?
  - Reconstructing a “being-in-the-world”
  - ➔ The work of psychotherapists?

3/3. Sensory knowledge

- Two kinds of knowledge
  - Immediate ‘being-in-the-world’: undoubted knowledge
  - Uncertain result of a guided reconstruction of “being-in-the-world”.
- Particular properties of the reconstruction
  - repeatable and identical within our collective of ‘experts’ (experts’ specificity)
  - Inclusive of any odor by allowing the confrontation of experts’ olfactory experiences (field of odors’s specificity)

Conclusion

- Perceiving = existing and constructing reality
- Two different modalities of experience
  - Immediate experience
  - ‘sensible’ experience
  - Other modalities?
- Perception learning = *guided* process of (re)construction
  - A variety of realities tied to a variety of modes of existence

1 pineapple
2 grapefruit
8 cherry
2 grapefruit
10 Blackcurrant
8 cherry
12 strawberry
10 Blackcurrant
13 framboise
2 grapefruit
12 strawberry
15 violet
10 Blackcurrant
13 framboise
18 lychee
13 framboise
15 violet
19 green pepper
15 violet
21 truffle
29 pear
22 liquorice
48 toast
32 pepper
25 liquorice
43 butter
29 pear
48 toast
32 pepper
50 vanilla
35 smoke
39 boxwood
43 butter
47 roasted hazelnut
48 toast
50 vanilla

Liste des Arômes

1	Abricot	28	Girofle
2	Acacia	29	Goudron
3	Amande amère	30	Iode
4	Ananas	31	Muscat
5	Anis	32	Menthe
6	Aubépine	33	Mercaptan
7	Banane	34	Miel
8	Beurre	35	Musc
9	Bouchon	36	Noisette
10	Cacao	37	Noix
11	Cannelle	38	Orange
12	Café	39	Pivoine
13	Caramel	40	Pin
14	Cassis	41	Poire
15	Cerise	42	Poivre
16	Champignon	43	Poivron-vert
17	Chêne	44	Pomme
18	Citron	45	Prune
19	Civette	46	Réglisse
20	Coing	47	Rose
21	Eglantine	48	Soufre
22	Foin coupé	49	Thym
23	Fougère	50	Tilleul
24	Fraise	51	Truffe
25	Framboise	52	Vanille
26	Fumé	53	Violette
27	Géranium	54	Vinaigre

Le Nez du Vin
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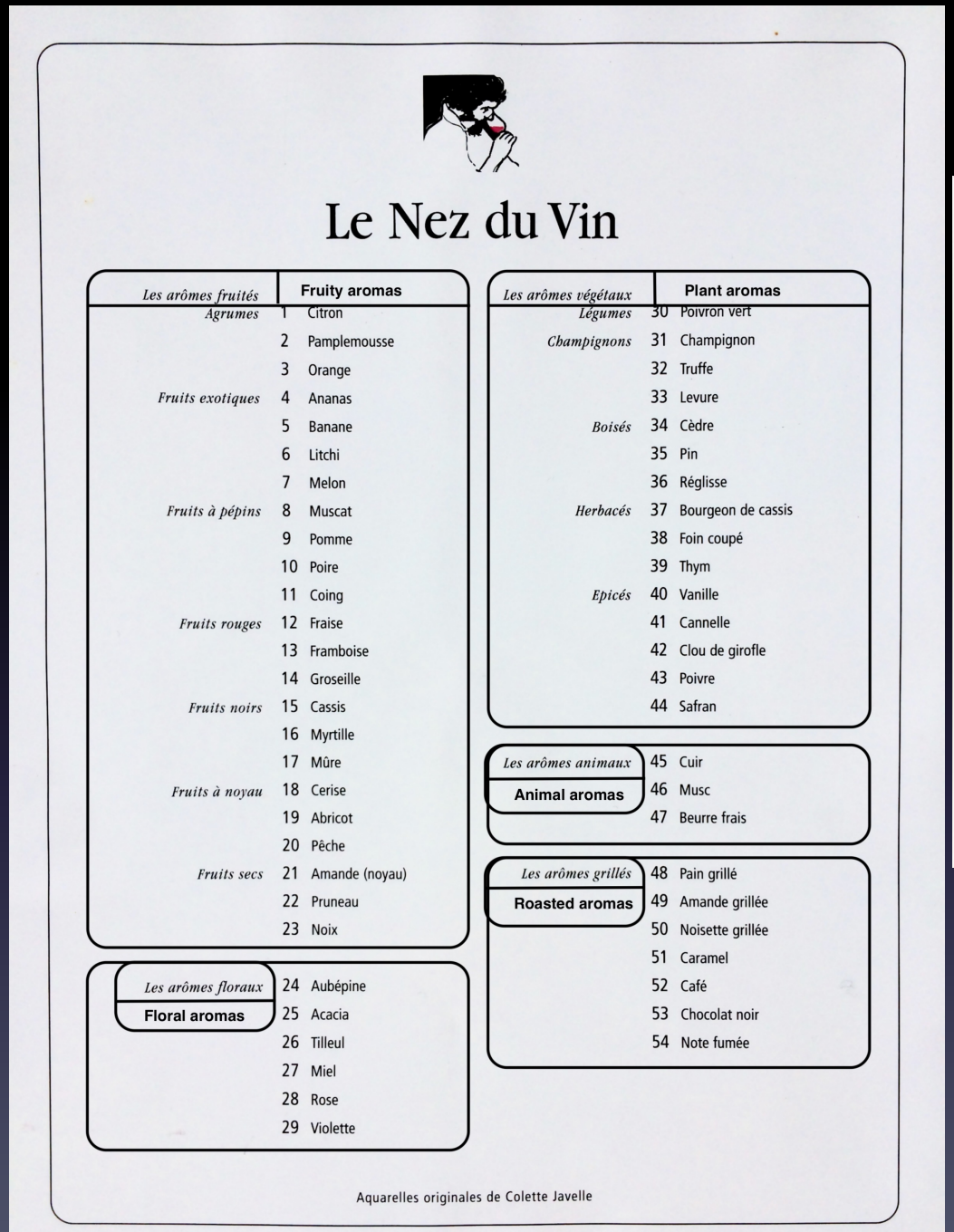
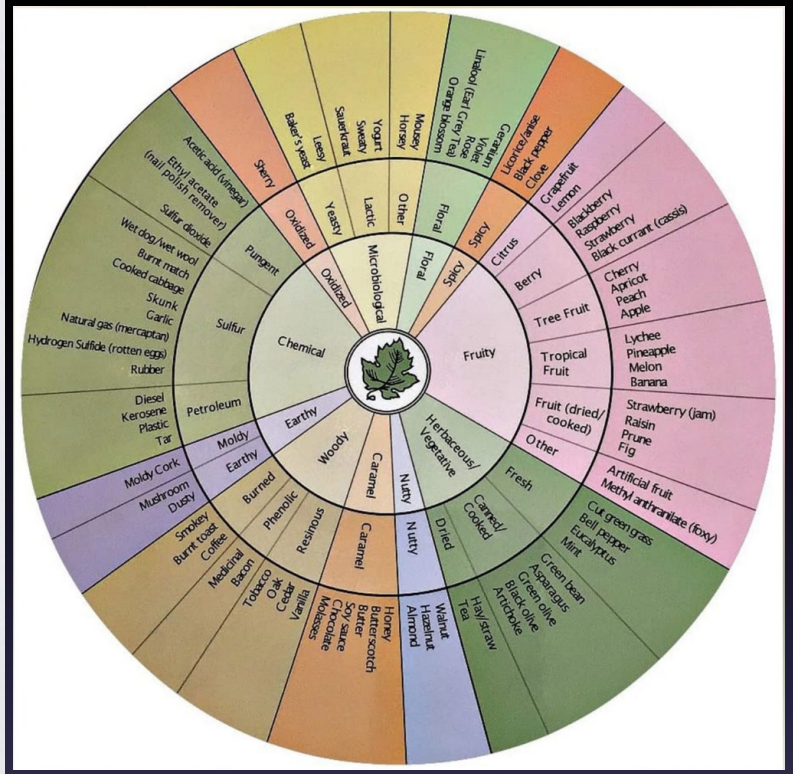
Odor references

		Raspberry	R	1-2 crushed fresh or frozen raspberries
		Strawberry	R	1-2 crushed fresh or frozen strawberries
		Black Currant/cassis	W/R	10 mL liquor from canned black currants and 5 mL Ribena® (sweetened concentrate) or 10 mL Cassis
	(Tree) Fruit	Cherry	R	10 mL brine of canned cherries
		Apricot	W	15-20 mL apricot nectar
		Peach	W	15-20 mL peach nectar or syrup from canned peaches
		Apple	W	Slice fresh apple, 5 mL apple juice
	(Tropical) Fruit	Pineapple	W	2-4 mL freshly opened canned pineapple juice
		Melon	W	1 piece fresh ripe canteloupe (20 mm cube)
		Banana	W	1 10-mm slice fresh banana
	(Dried) Fruit	Strawberry jam	R	1 tsp strawberry jam
		Raisin	R	5-8 crushed fresh raisins
		Prune	R	1-2 mL prune juice
		Fig	W/R	1/2 fig or 5-10 mL brine from canned figs
	Other	Artificial fruit	R	7-8 grains Tropical Punch Kool-Aid® or tropical fruit flavoring
		Methyl anthranilate	W/R	2-5 mL Welch's® grape juice
Herbaceous/vegetative	Fresh	Stemmy	W/R	4 crushed grape stems
		Grass, cut green	W/R	1 shredded 20-mm blade of green grass
		Bell pepper	W/R	12 mm × 10 mm slice of bell pepper; soak 30 min and remove
		Eucalyptus	W/R	1 crushed eucalyptus leaf
		Mint	W/R	1 crushed mint leaf or 1 drop mint extract
Herbaceous/vegetative	Canned/cooked	Green beans	W/R	3-5 mL brine from canned green beans
		Asparagus	W/R	2-3 mL brine from canned asparagus
		Green olive	W/R	4-6 mL brine from canned green olives
		Black olive	W/R	4-6 mL brine from canned black olives
		Artichoke	W/R	2-5 mL brine from cooked artichoke
	Dried	Hay/straw	W	Several pieces of hay, finely cut (no wine)
		Tea	W/R	3-4 flakes of black tea
		Tobacco	W/R	3-4 flakes of tobacco (least aromatic possible)
Nutty	Nutty	Walnut	W/R	1-2 walnuts, crushed (no wine)
		Hazelnut	W/R	1-2 hazelnuts, ground (no wine)
		Almond	W/R	1 drop almond extract/100 mL wine or 1-2 almonds ground (no wine)
Caramelized	Carmel	Honey	W	5-8 mL honey
		Butterscotch	W/R	1 butterscotch Life Saver® & 1 cut Kraft Caramel®
		Diacetyl (butter)	W/R	1 drop butter flavored extract/100 mL wine
		Soy sauce	R	1-2 drops soy sauce
		Chocolate	R	2-5 mL chocolate flavor or 1/2 tsp powdered cocoa
		Molasses	R	1-3 mL molasses
Wood	Phenolic	Phenolic	W/R	1 mg ethyl guaiacol
		Vanilla	W/R	1-2 drops vanilla extract
	Resinous	Cedar	R	1 drop cedar oil or few shavings of cedar wood
		Oak	W/R	2-3 mL of Oak flavor (Oak Mor, Finer Filter Products, Newark, CA)
	Burned	Smoky	W/R	1 drop smoky flavor extract/150 mL wine
		Burnt toast/charred	W/R	1 small piece burnt wood in 200 mL wine
		Coffee	R	2-4 grains ground coffee
Earthy	Earthy	Dusty	R	NA[3]
		Mushroom	W/R	1 small mushroom, finely sliced/10 mL wine
	Moldy	Musty (mildew)	W/R	piece of mildewed cloth (no wine)
		Moldy cork	W/R	pieces of moldy cork (no wine)
Chemical	Petroleum	Tar	R	1 drop roofing tar, let sit overnight in wine
		Plastic	W/R	Cut up plastic tubing
		Kerosene	W/R	1 drop kerosene/150 mL wine
		Diesel	W/R	1 drop diesel/150 mL wine or 1 drop WD-40/50 mL wine
	Sulfur	Rubbery	W/R	1 10 mm × 5 mm piece of cut rubber tubing or bike tire (let sit several hours)
		Hydrogen sulfide	W/R	1 ppb hydrogen sulfide in wine; or 1/8 yolk of hard boiled egg (no wine)
		Mercaptan	W/R	5 ppb ethanethiol in wine; or smell natural gas which contains ethanethiol
		Garlic	W/R	1 5 mm × 5 mm piece crushed garlic in 150 mL wine; soak for up to 1 min and remove
		Skunk	W/R	NA
		Cabbage	W/R	2-3 mL brine from boiled cabbage leaves
		Burnt match	W/R	Burn 1 wooden match, extinguish; when cool, add 150 mL wine
		Sulfur dioxide	W	250 mg/L sulfur dioxide
		Wet wool, wet dog	W	Small piece of heated wet wool (no wine)
	Papery	Filter pad	W/R	Soak 20 mm × 20 mm piece filter pad overnight in 100 mL wine
		Wet cardboard	W/R	Soak 20 mm × 20 mm piece cardboard overnight in 100 mL wine
	Pungent	Ethyl acetate	W/R	1 drop ethyl acetate/50 mL wine
		Acetic acid	W/R	2-5 mL vinegar/50 mL wine or 2 drops glacial acetic acid/50 mL wine
		Ethanol	W/R	10-15 mL ethanol/50 mL wine
		Sulfur dioxide	W	250 mg/L sulfur dioxide
	Other	Fishy	W/R	1 drop trimethylamine/50 mL wine or few grains anion exchange resin in hydroxide form (no wine)
		Soapy	W/R	Few flakes Ivory® soap or grains Borax®
		Sorbate	W/R	50 mg potassium sorbate
		Fusel alcohol	W/R	300 mg/L of 2-methyl-1-butanol and/or 3-methyl-1-butanol
Pungent	Hot	Alcohol	W/R	40% v/v ethanol in water or wine
	Cool	Menthol	W/R	NA
Oxidized	Oxidized	Acetaldehyde	W/R	40 mg/L acetaldehyde or 5 mL sherry/25 mL wine
Microbiological	Yeasty	Flor-yeast	W	NA
		Leesy	W/R	NA
	Lactic	Sauerkraut	W/R	2-5 mL brine from canned sauerkraut
		Butyric acid	W/R	1 drop *n*-butanoic acid/100 mL wine
		Sweaty	W/R	1 drop isopentanoic acid/100 mL wine
		Lactic acid	W/R	NA
	Other	Horsey	W/R	1 mg *p*-cresol/100 mL wine
		Mousey	W/R	0.5-1 mg 2-ethyl-3,4,5,6-tetrahydropyridine/L wine

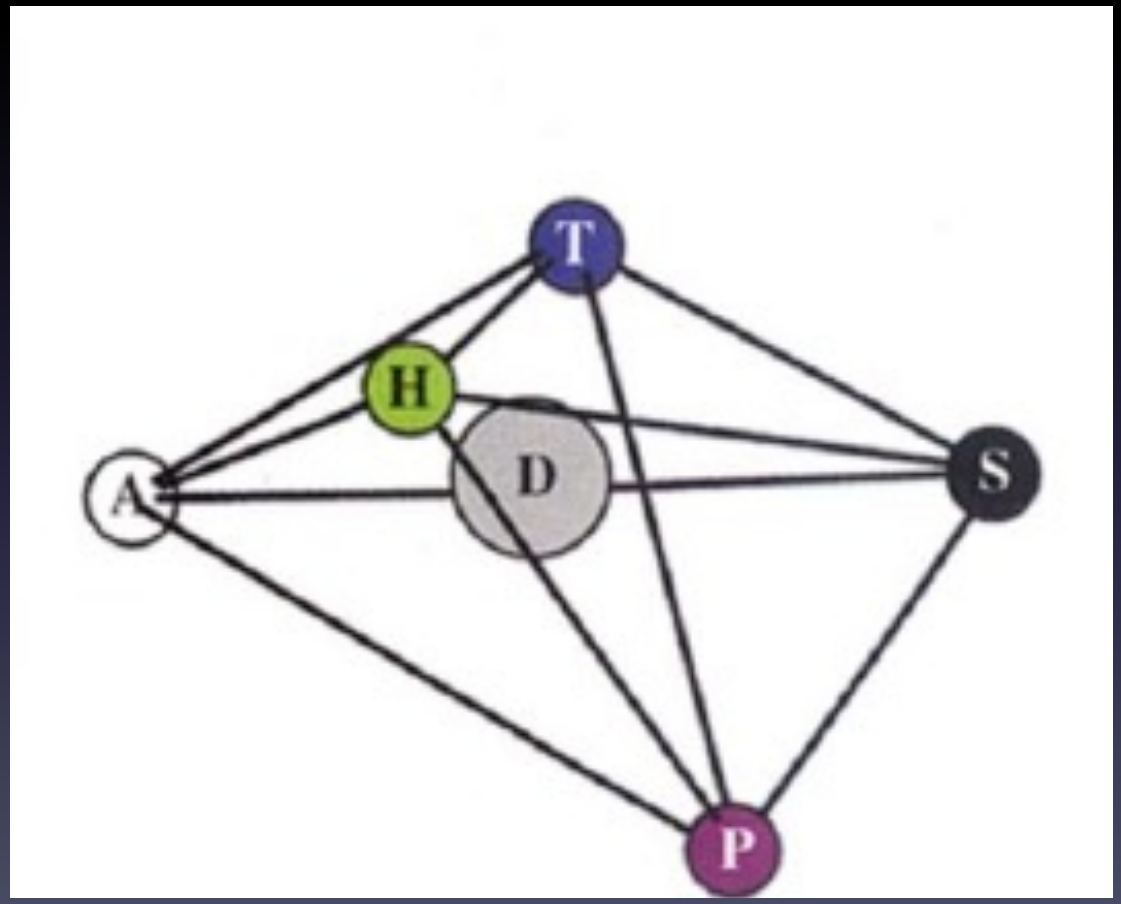
Noble, A. C., Arnold, R. A., Buechsenstein, J., and al. 1987. Modification of a Standardized System of Wine Aroma Terminology. *American Journal of Enology and Viticulture*, 38, 143-146.

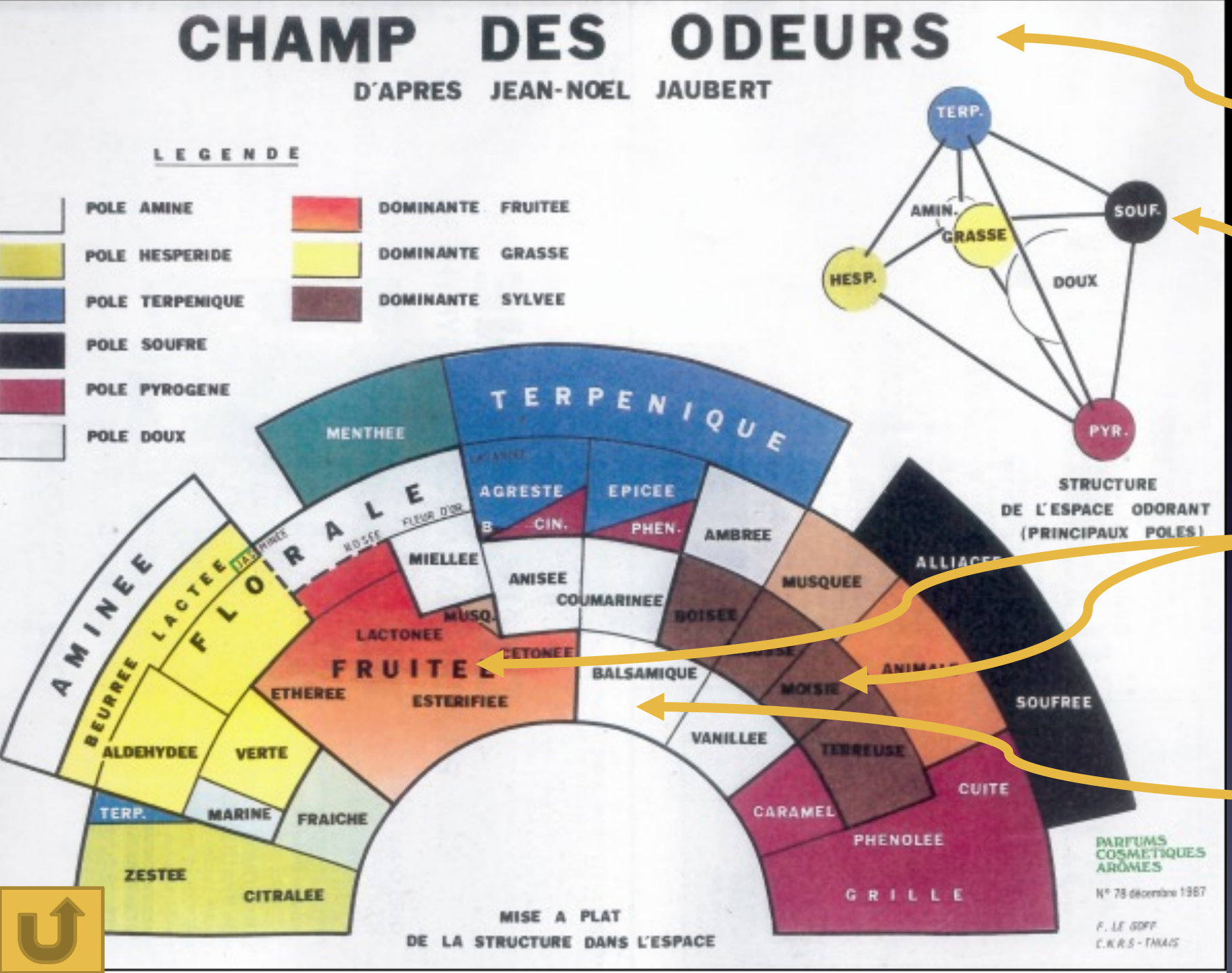
Odor classifications





The seven odorous poles



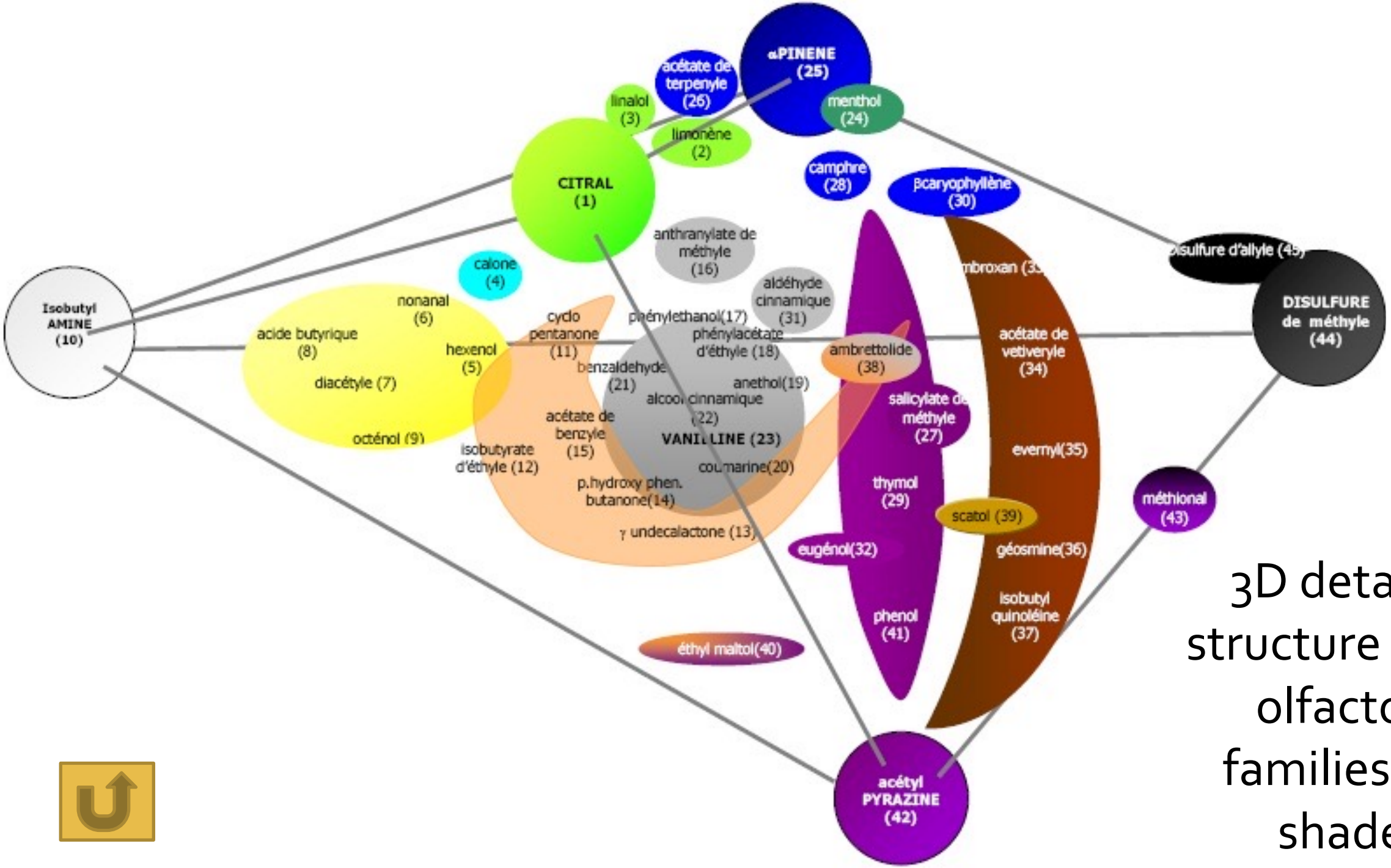


2D general spatial projection of the 7 olfactory families

3D general spatial view of the 7 olfactory families

Intermediary zones between the poles

Each box/names corresponds to one odorous hue illustrated by 1 odour reference



3D detailed structure of the olfactory families and shades