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Description of Coffee Aroma with the Electronic Nose which Learned Wine Aromas, “Le Nez du Vin”

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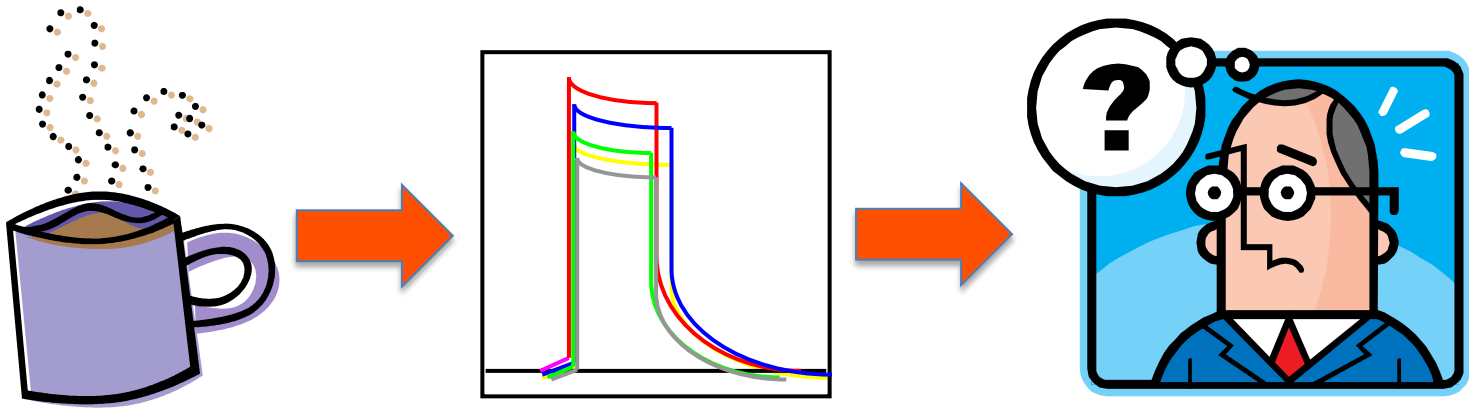
Background

1. Coffee aroma is considered to be one of the most complicated food aromas which have more than 600 components. (Schaller, E (1998))
2. For evaluation of the coffee qualities, cup tests are usually performed by expert tasters. However, it depends on the skill of the tasters (Rodriguez, J (2010))
3. Sensor technologies have been applied to evaluate the qualities objectively. (Schaller, E (1998))

Problem:
However, it is difficult to understand the feature of coffee aroma directly from the electronic signals of sensors.



AIM

To Describe coffee aroma understandably from the electronic signals

FF-2A electronic nose
(Shimadzu corporation)

- FF-2A can describe similarities to the 9 standard gasses in default setting.

  Fujioka K et al. Plos One (2009)

- 9 standard gasses
  (1)Hydrogen sulphide, (2) methylmercaptan,
  (3) ammonia, (4) trimethylamine,
  (5) propionic acid, (6) butylaldehyde,
  (7) butylacetate, (8) toluene, (9) heptane

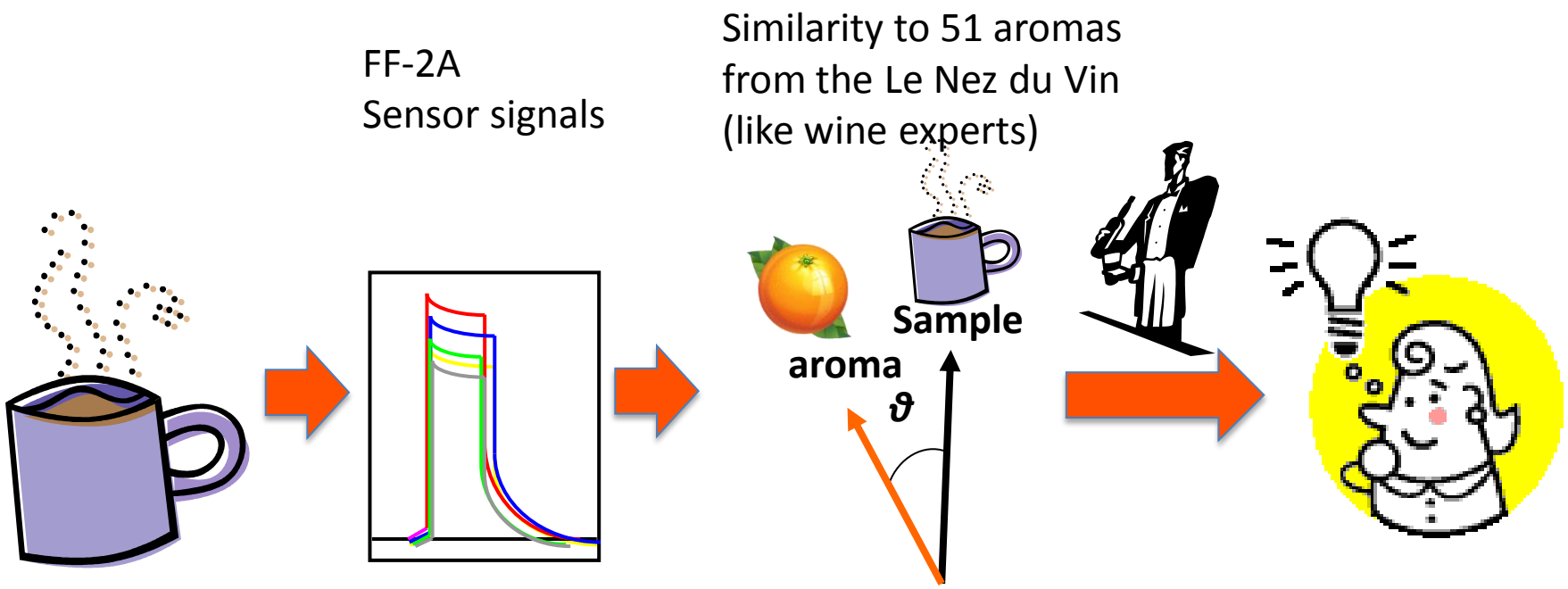
Le Nez du Vin
(Wine aroma kit)

Expansion of Description

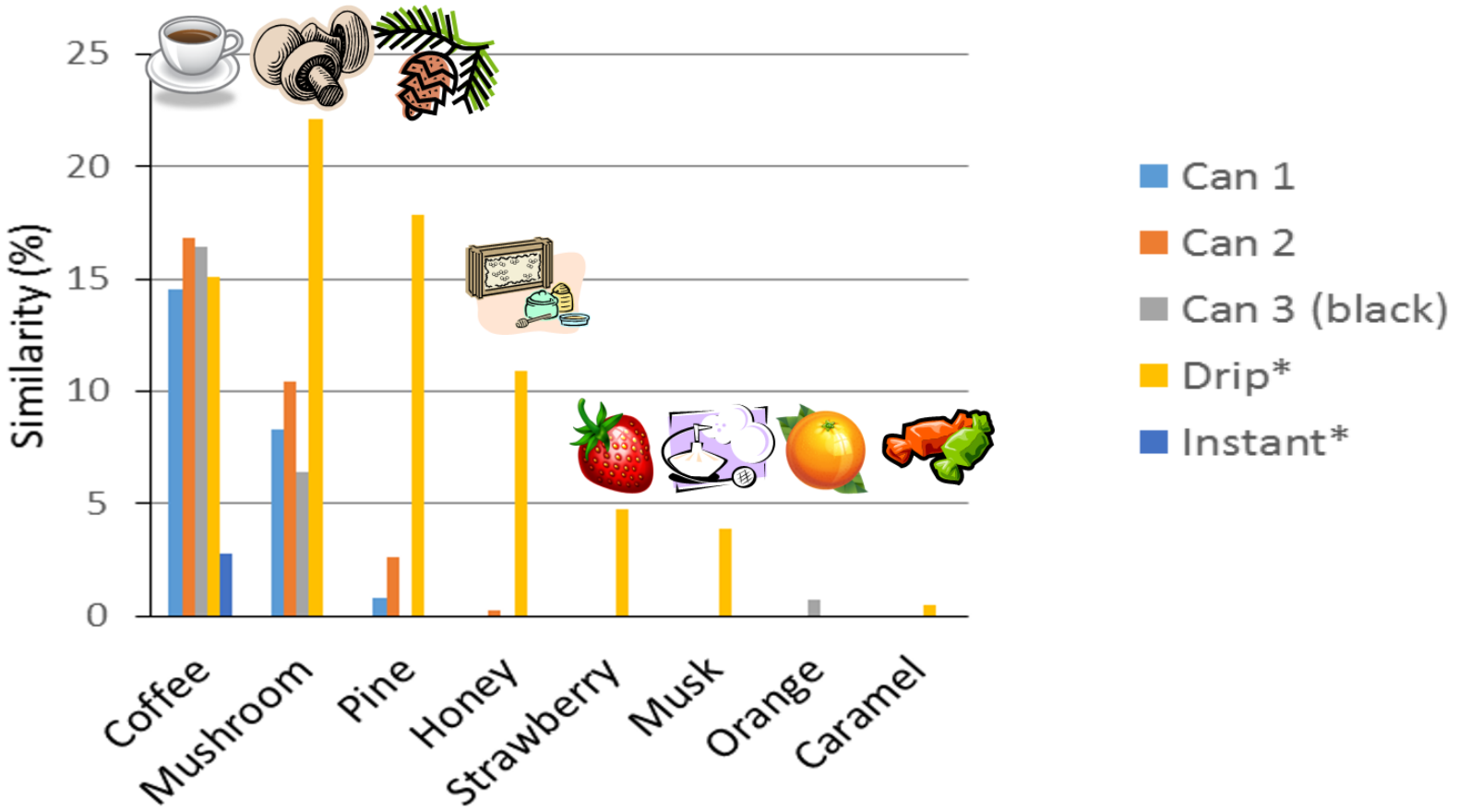
- Recording of signals from several aromas in wine aroma kit, Le Nez du Vin (Editions Jean Lenoir).
- Calculation of the similarities between coffee aroma samples and the wine aromas.

Methods

- **Coffee aroma sample:**
  Drip coffee (Colombia), Instant coffee (Colombia type),
  Canned coffees (2 coffees with milk, sugar & flavor, 1 black coffee)
  *Note: The data from the Drip coffee and the Instant coffee were referred to our previous report (Fujioka K et al. *The Japanese Journal of Taste and Smell Research*, 2013).
- **Similarities to wine aromas of Le Nez du Vin and cofees:**
  51 aromas were selected from the Le Nez du Vin.
  Similarities were calculated with the Asmell2 software (Shimadzu).
  The aromas which indicated similarity > 0 were shown in this presentation.

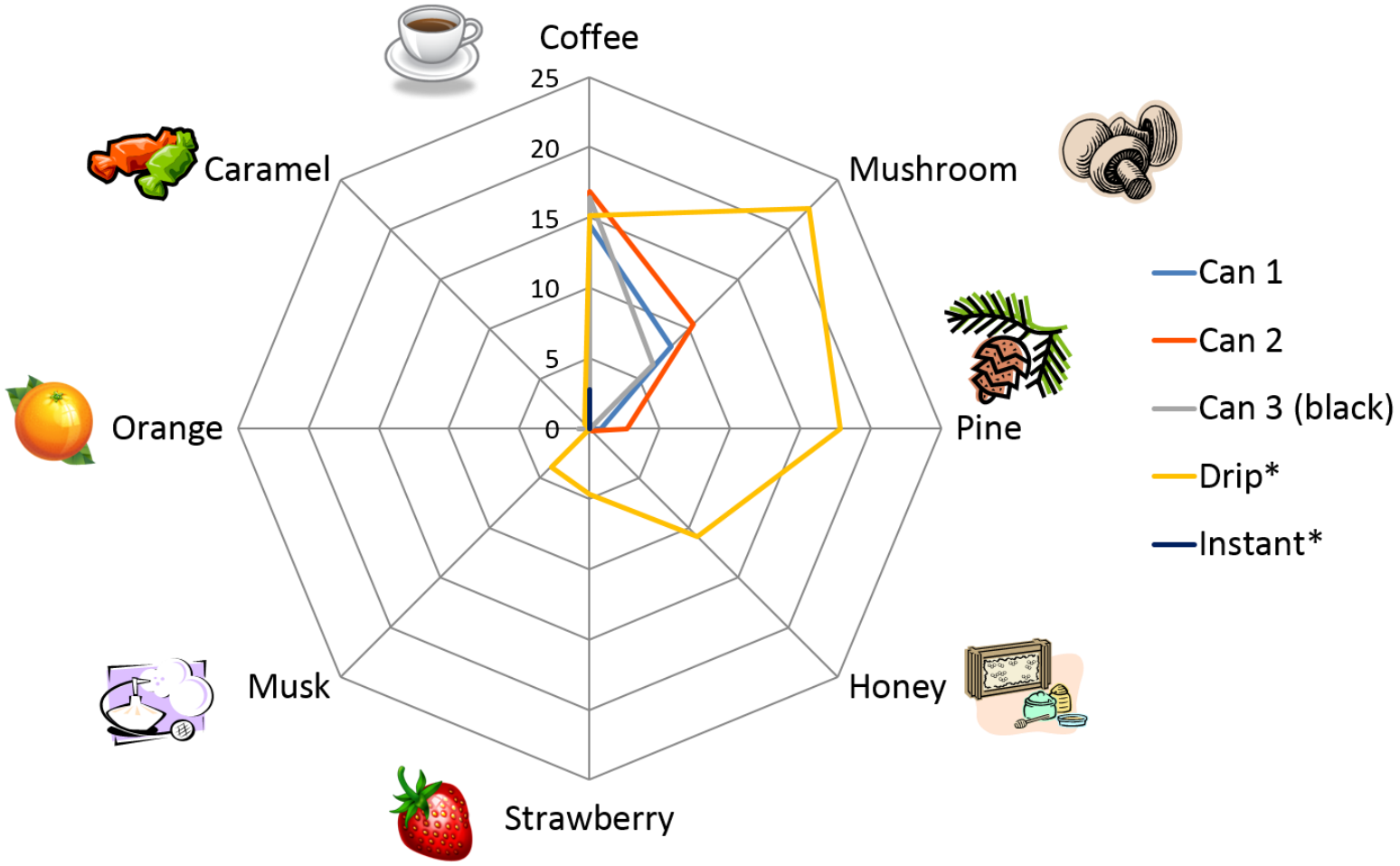


Result: Similarities of coffee sample to 8 aromas (Bar graph)



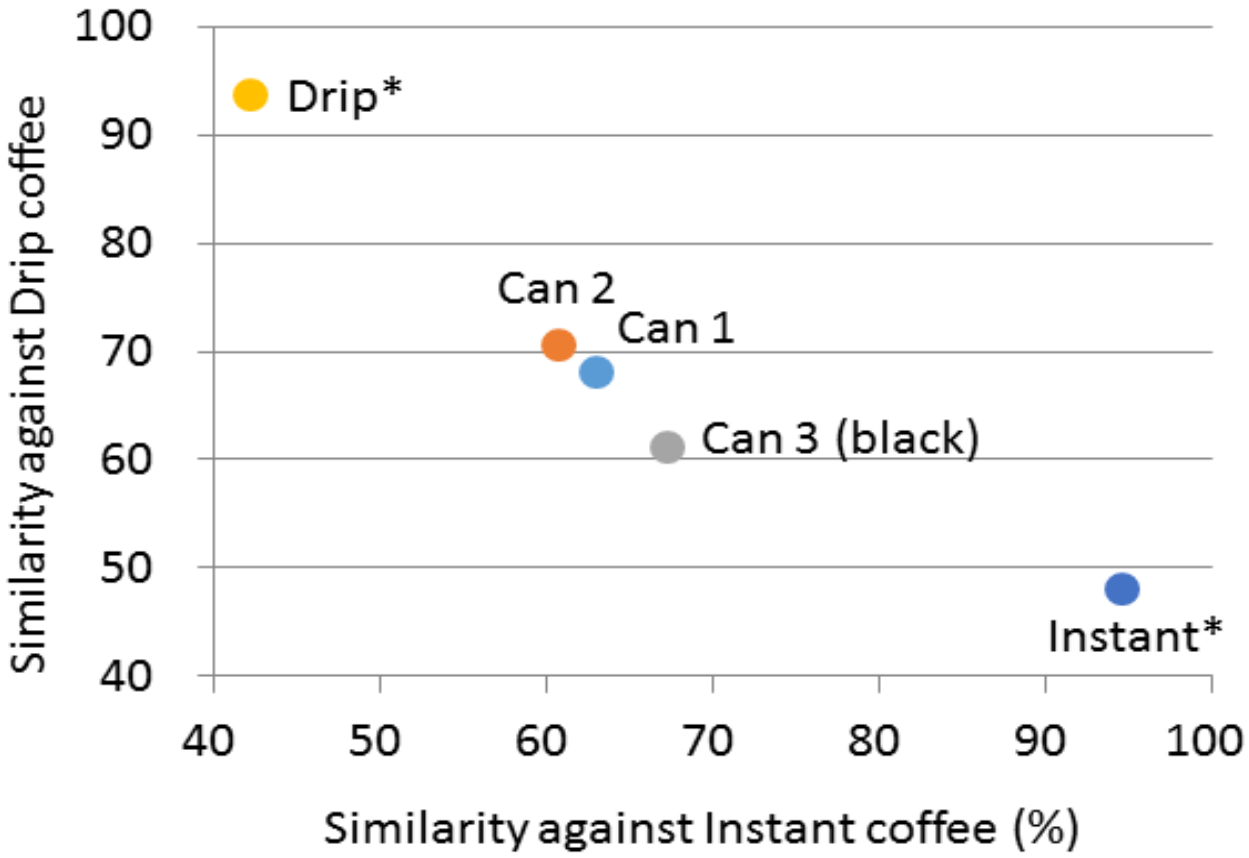
- Canned coffee: Coffee, Mushroom, Pine (Can 1, 2), Honey (Can 2), Orange (can 3)
- Drip coffee: Coffee, Mushroom, Pine, Honey, Strawberry, Musk, Caramel
- Instant coffee: Coffee

Result: Similarities of coffee sample to 8 aromas (Rader Chart)



- The patterns of canned coffees were similar to each other.

Result: Similarities of coffees to Drip and Instant coffees



- Canned coffees has both similarities to Drip and Instant (> 60%)

Discussion

- Analysis data indicated that the drip coffee had more complex aromas than other coffees.
- All the coffees were similar to Coffee aroma & Mushroom aroma. Mushroom aroma may contribute to *Koku* taste, mouthfulness and continuity of the flavor. (Ref: Hayase, F. et al. (2013))
- Canned coffees has both similarities to Drip and Instant coffees which may reflect market segmentation.

Study limitations

- Similarity with the wine aromas may need further data fitting to human olfactory senses.
- The expansion of descriptors about coffee aromas using coffee specific chemicals may be needed for more optimal description.
- Measurement condition will need optimization. (sample volume, temperature, dilution gas etc.)

Conclusion

- The electronic nose which learned wine aromas has the potential to describe the features of coffee aromas objectively.