



# Sensory characterization of DIVERSIFY species

WP 28

Working group: Niki Alexi, Luis  
Guerrero, Oxana Lazo, Kriton  
Grigorakis\*

# Aims & scope

- ❖ To assess the sensory quality of DIVERSIFY species
- ❖ To evaluate the hedonic responses of consumers towards DIVERSIFY species
- ❖ To evaluate a new methodological approach (CATA with semi-trained participants) on evaluating the sensory quality of fish species

## Why?

Traditional approach (Descriptive Analysis)

- ❖ Time-consuming
- ❖ Expensive

# Background on methods

## Check-All-That-Apply (CATA)

❖ Checklist of attributes

❖ Product

*“Check all the attributes that you find present in the product”*

▪ Garlic odour	<input type="checkbox"/>
▪ Butter odour	<input checked="" type="checkbox"/>
▪ Firm texture	<input checked="" type="checkbox"/>
▪ Earthy flavour	<input type="checkbox"/>

Results:

0 (absence)/1 (presence) measurements →

Frequencies of attribute citation (CATA counts) for each product

# Sensory quality of DIVERSIFY species

## Descriptive analysis (DA)

Trained panel (n=8)

- 22 attributes
- Intensity (10 point)
- Training (References)
- Training duration: 30 hrs.
- Sample evaluation: 5 sessions
- Total duration: 35 hrs.

## Check-All-That-Apply (CATA)

Consumers (n=70)

- 25 attributes
- Checklist
- No training
- Sample evaluation: 1 session
- Total duration: 1 hr.

## Check-All-That-Apply (CATA)

Semi-trained (n=37)

- 25 attributes
- Checklist
- Training (References)
- Training duration: 1 hr.
- Sample evaluation: 1 session
- Total duration: 2hrs./10 participants (approx. 8 hours)

# M & M: Consumer test

**70 consumers**

**4 species**

Greater amberjack

Pikeperch

Meagre

Wreckfish



**Sensory  
evaluation**

- Aroma
- Appearance
- Taste
- Flavour
- Texture

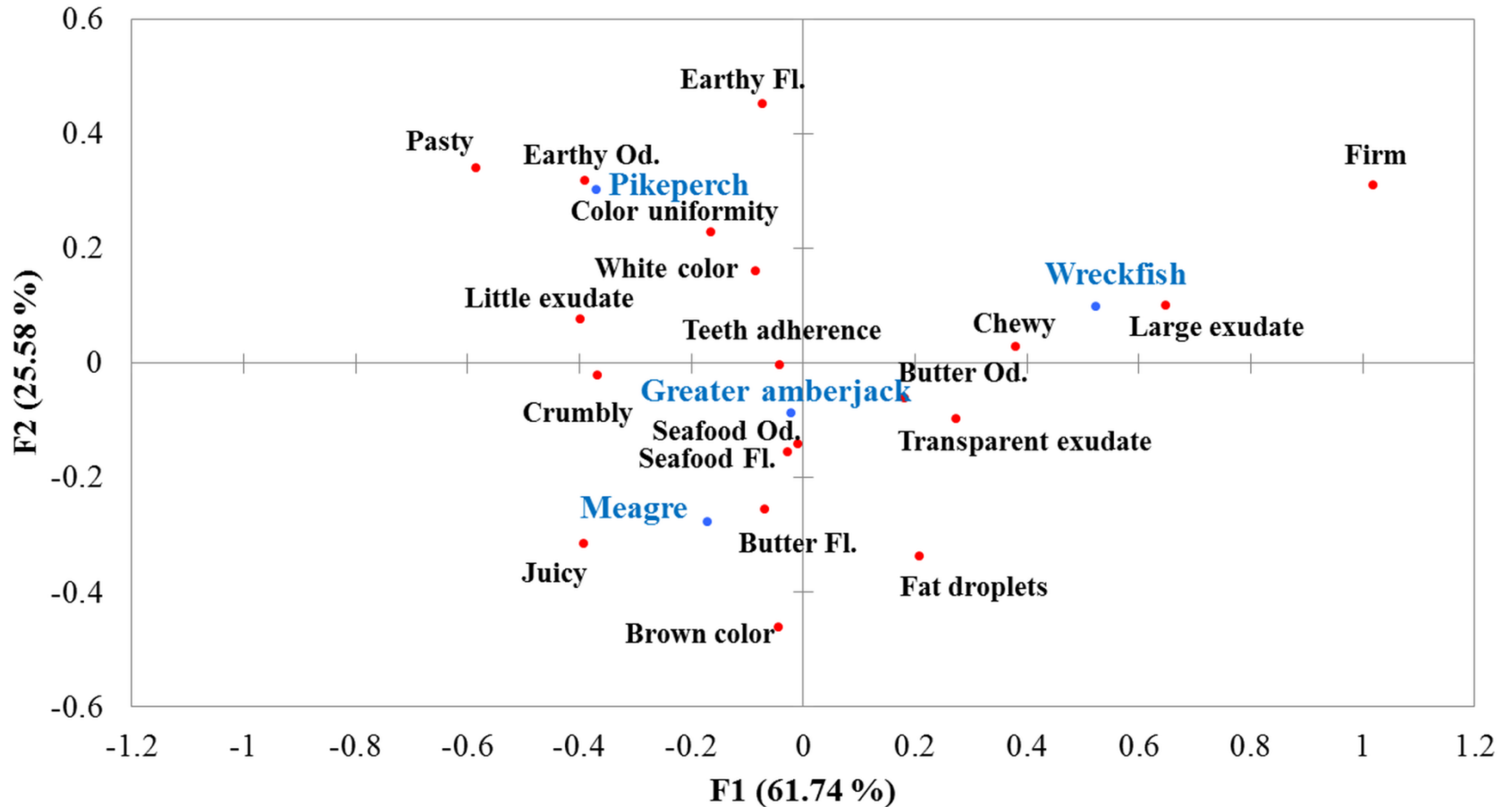
**Hedonic  
Ratings**

- 7-point scale
- “Like very much” to “Dislike very much”

**Questions**

- Demographics
- Behavioral
- Psychographics

# Results: Sensory map of species



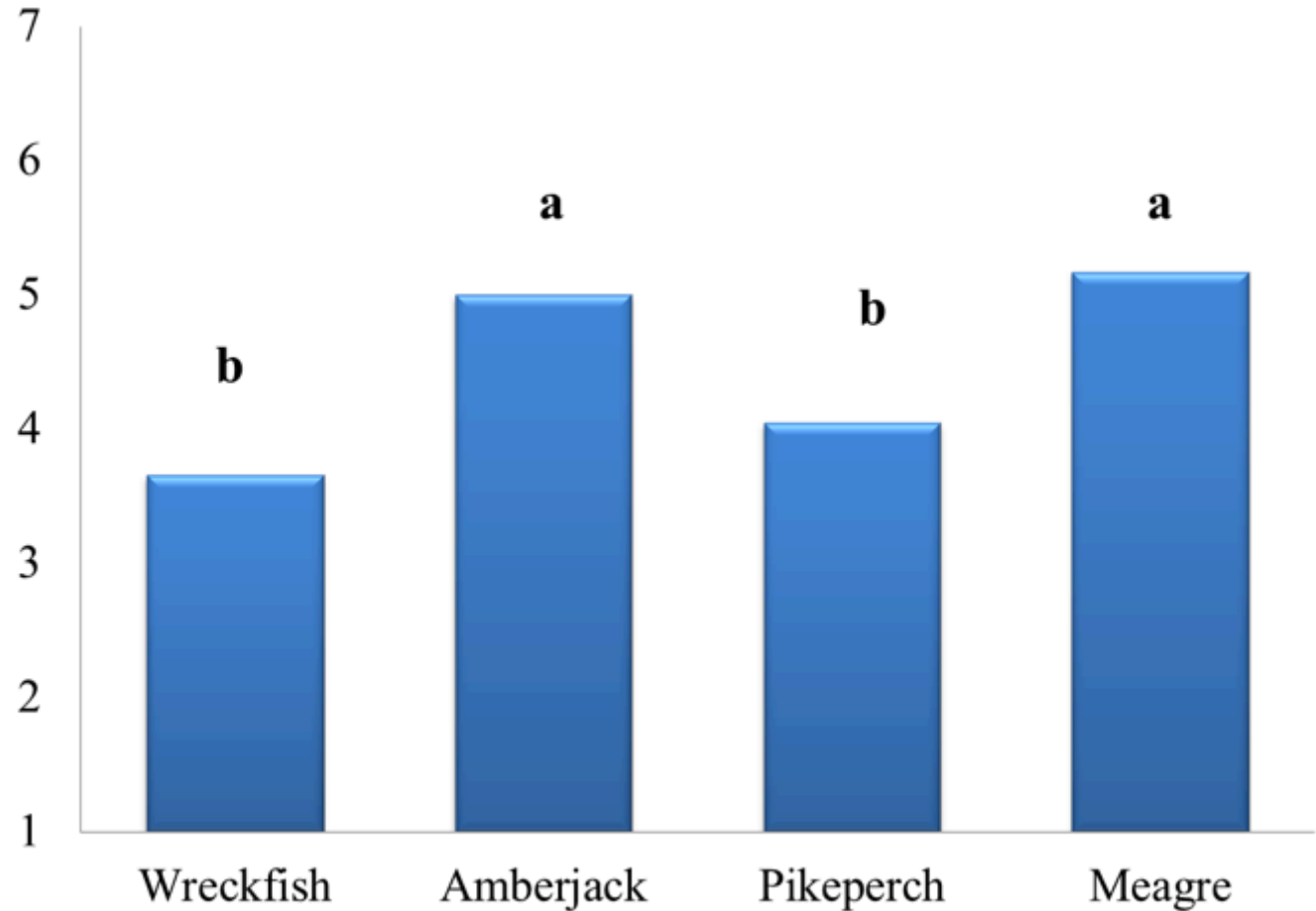
# Results: Hedonic responses

**Neither like/  
nor dislike**

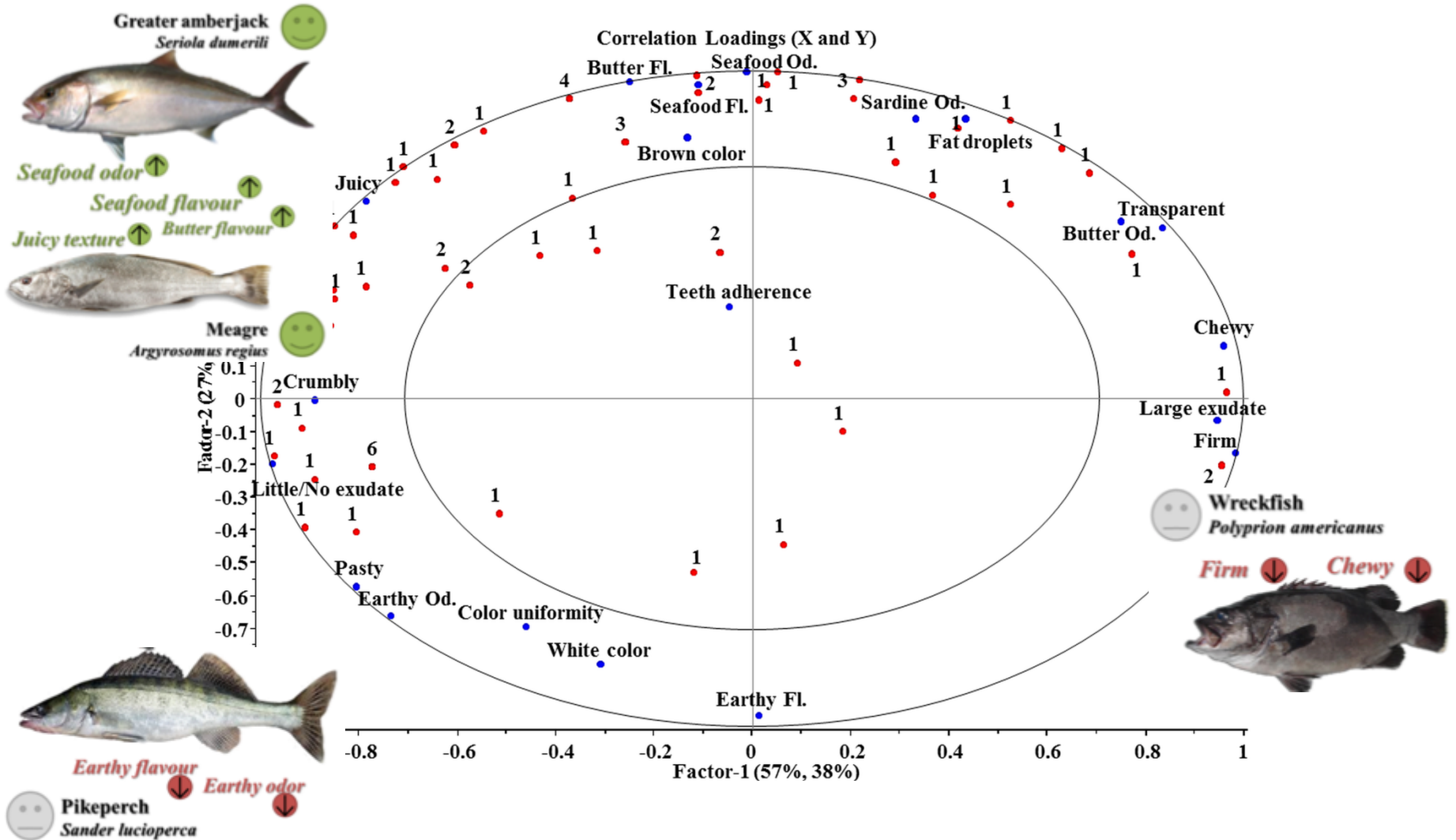
Wreckfish  
Pikeperch

**Like slightly**

Meagre  
Greater amberjack



# Results: preference mapping

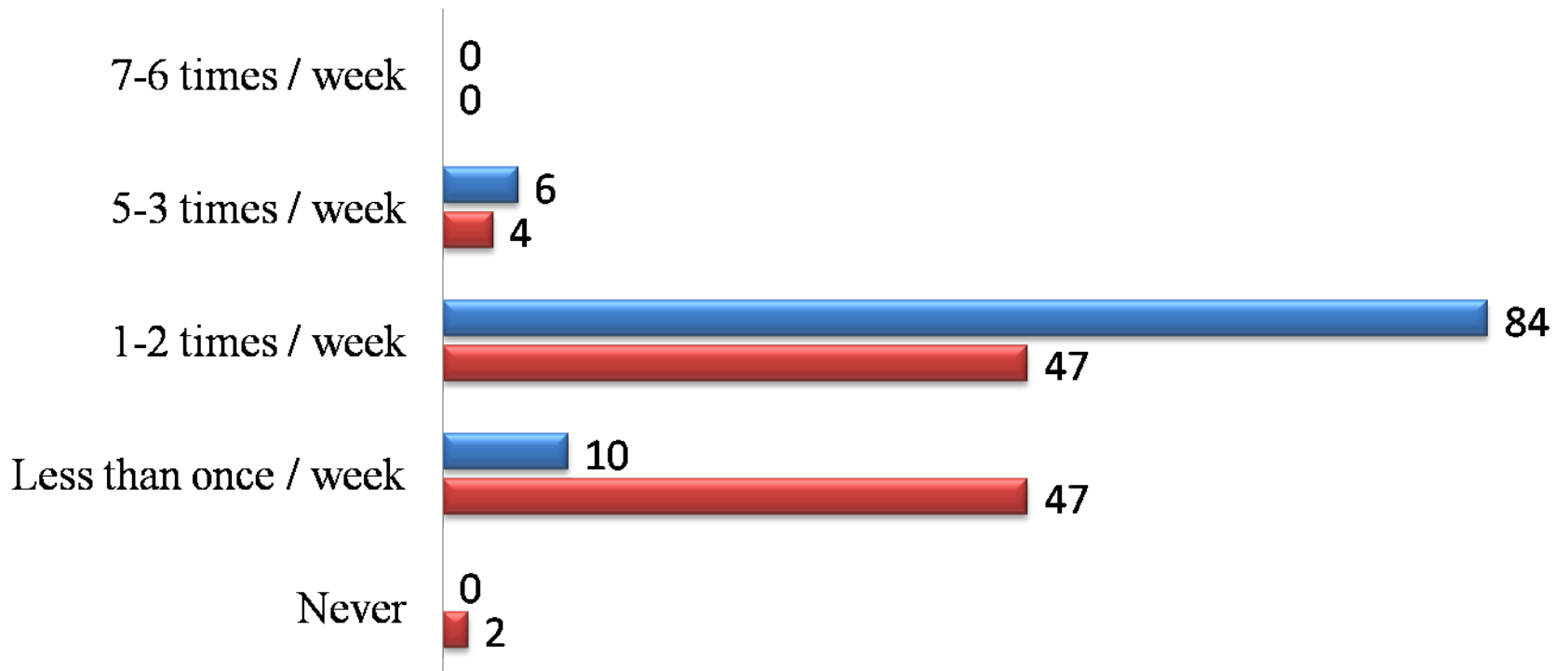




# Results: Behavioral responses

## Consumption frequencies (%)

■ Fish ■ Processed fish products



# Results: Behavioral responses

## Types of fish products purchased

- ❖ Fresh 84%
- ❖ Frozen 19%
- ❖ Processed 11%

## Purchase of farmed fish

- ❖ Yes 69%
- ❖ No 21%
- ❖ I don't know 10%

# Conclusions: Consumer study

- Meagre and Greater amberjack similar sensory profiles, pikeperch and wreckfish distinct ones
- Sensory variation mainly texture driven
- Meagre and greater amberjack higher hedonic responses than pikeperch and wreckfish
- Odour/ flavour equally important with texture to hedonic responses



# M & M: CATA with semi-trained (CATA-ST)

**References of comparison:**

- ❖ DA with Trained panelists (DA-TP)
- ❖ CATA with Consumers (CATA-C)

**Evaluation of method on:**

**Similarity in samples' configurations**

- Multiple factor analysis (MFA)
- RV coefficients

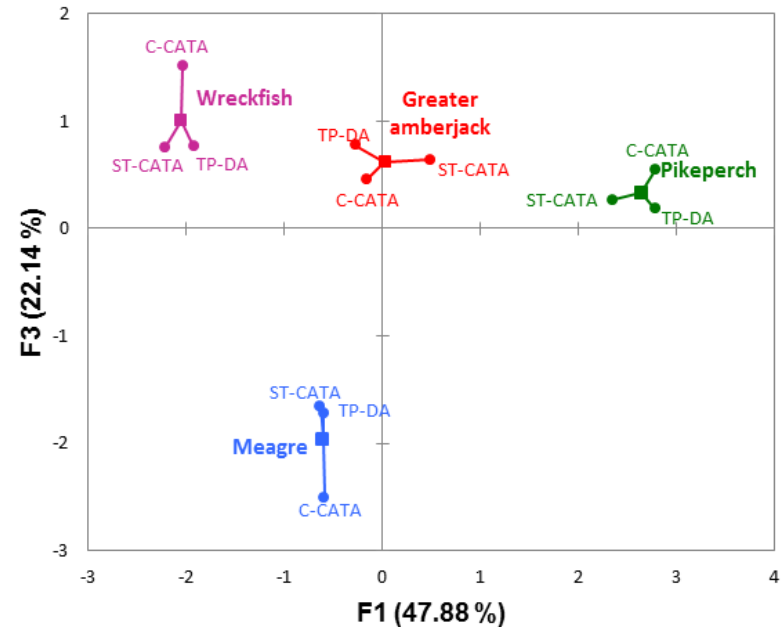
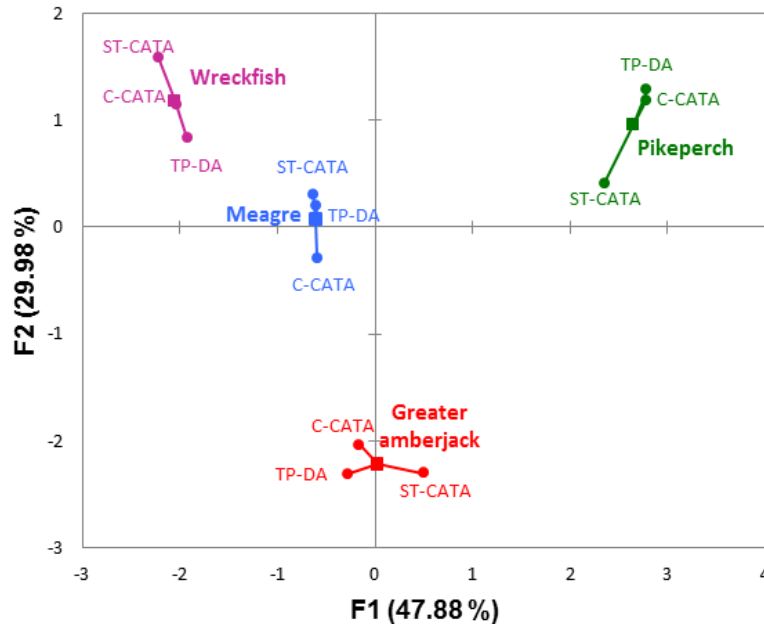
**Explained sensory and product variations**

- Discriminant Partial Least Square Regression (D-PLSR)

**Sensory profiles & Stability**

- Significance testing
- Bootstrapping
- Sensory maps

# Results: MFA & RV coefficients



F1 & F2 (77.9%) RV coefficients

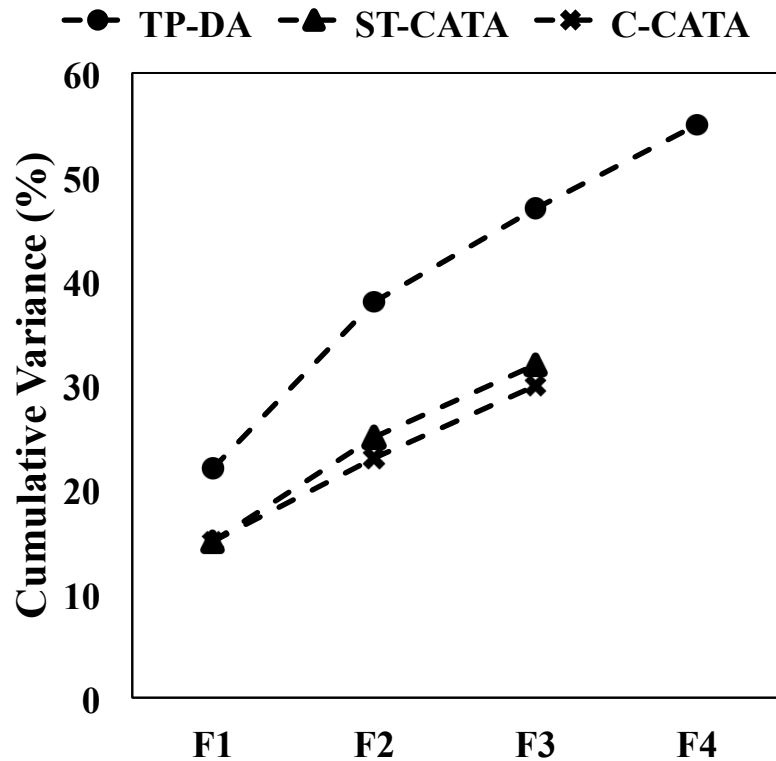
- ❖ TP-DA & ST-CATA → **0.94\*\*\***
- ❖ TP-DA & C-CATA → 0.79 (ns)
- ❖ ST-CATA & C-CATA → 0.77 (ns)

F1 – F3 (100%) RV coefficients

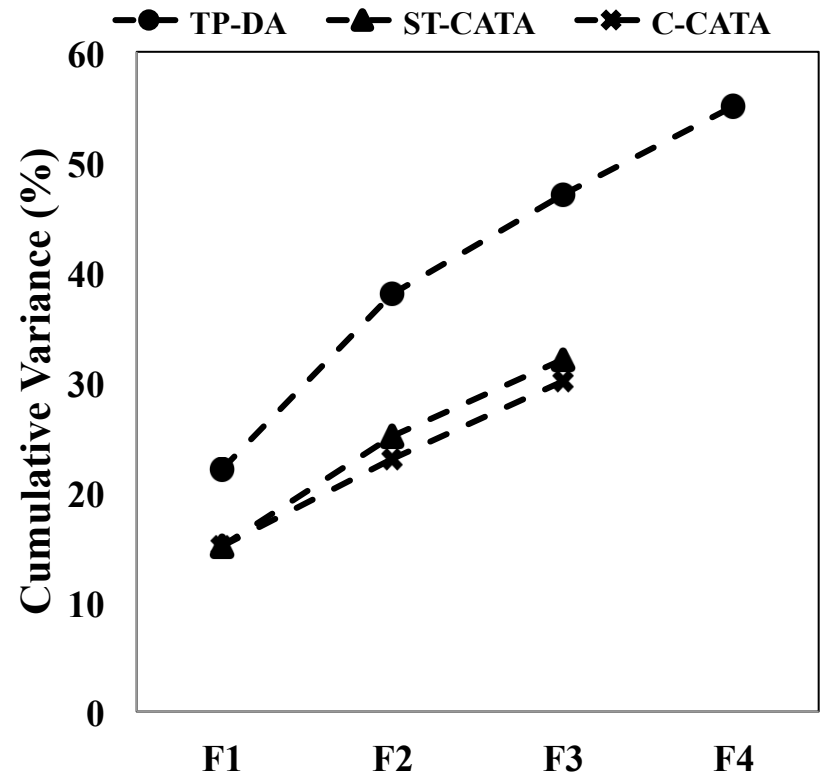
- ❖ TP-DA & ST-CATA → **0.95\***
- ❖ TP-DA & C-CATA → 0.98 (trend)
- ❖ ST-CATA & C-CATA → **0.95\***

# Results: D-PLSR

## Extend of explained sensory variations (attributes)



## Extend of explained product variations (species)



# Significance & CATA attribute citation frequencies

## Significance testing –sensory attributes

TP-DA: 15/22

- ❖ Mixed model ANOVA

ST-CATA: 17/25

- ❖ Conchran's Q

C-CATA: 19/25

- ❖ Conchran's Q

## Citation frequency of attributes in CATA methods

ST-CATA C-CATA **attribute citation frequency**

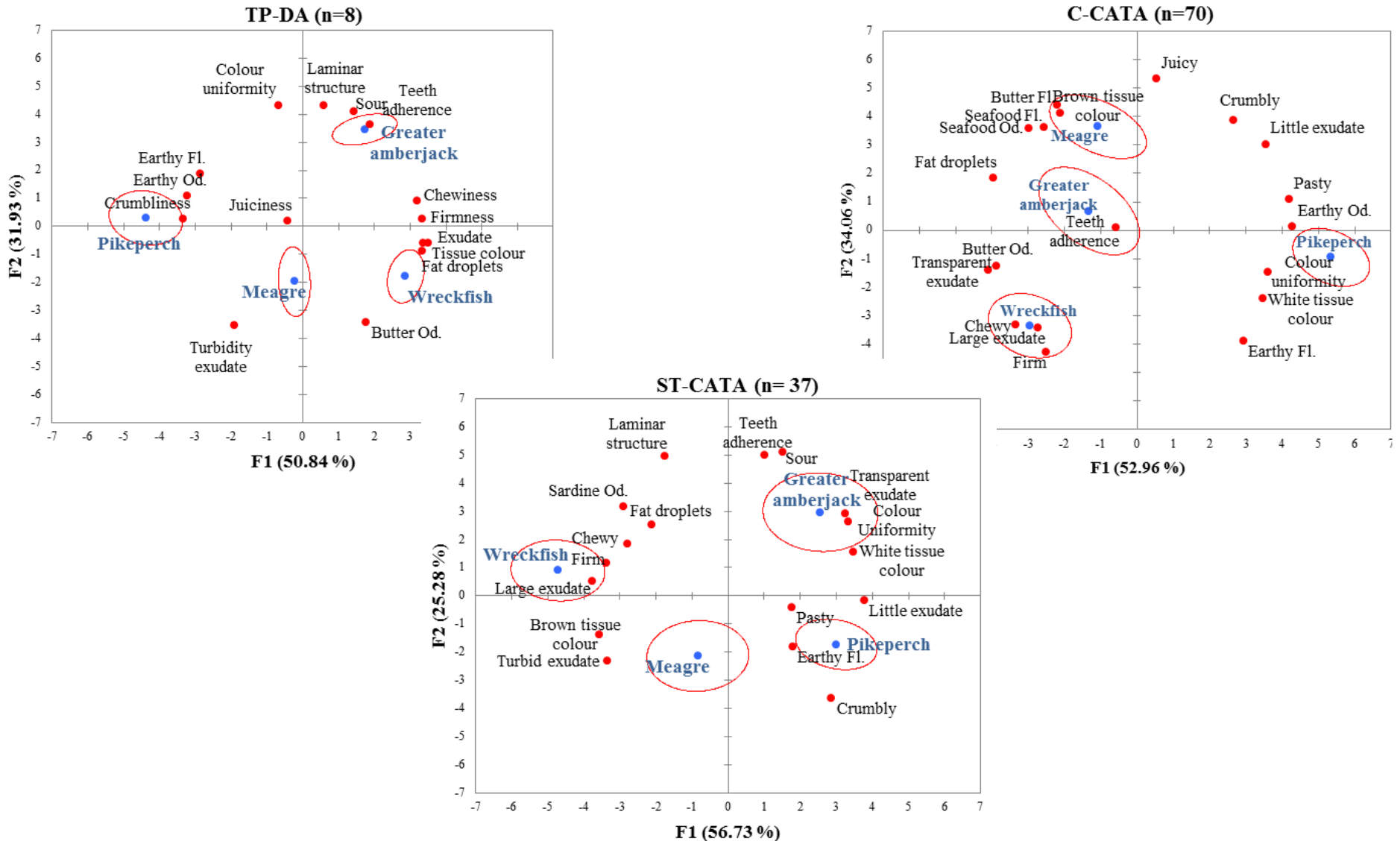
- ❖ 23-10% ↑ 7/9 appearance attributes

- ❖ 18-14% ↑ 2/2 taste attributes

- ❖ 26-8% ↑ 6/6 texture attributes

**In total 16/25 attributes >10% in citation frequency**

# Results: Sensory maps & stability

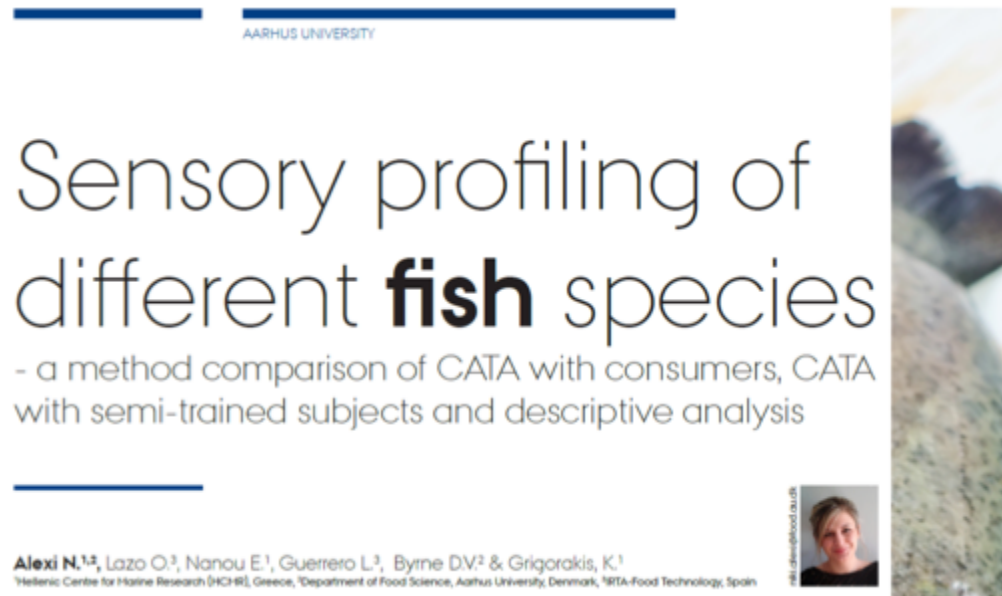




# Conclusions: CATA with semi-trained

- ❖ Degree of similarity in samples' configurations and sensory profiles: ST-CATA  $\rightarrow$  TP-DA
- ❖ Explained sensory & product variations: ST-CATA  $\approx$  C-CATA
  - ❖ ST-CATA  $\frac{1}{2}$  assessors of C-CATA
- ❖ ST-CATA  $\geq$  C-CATA attribute citation frequency
- ❖ ST-CATA similar stability with C-CATA
  - ❖ ST-CATA  $\frac{1}{2}$  assessors of C-CATA

# Conference Publications



- ❖ Alexi N., Lazo O., Nanou E., Guerrero L., Byrne D.V., Grigorakis K., 2016. Sensory profiling of different fish species – a method comparison of CATA with consumers, CATA with semi-trained subjects and descriptive analysis. Eurosense 2016.



EUROSENSE 2016

— *A Sense of Time* —

# Emerging peer-review Publications

- ❖ Alexi N., Nanou E., Byrne D.V., Grigorakis K., 2017, Consumer sensory profiling and acceptance of emerging European aquaculture fish species. *J. Sci. Food Agric., submitted*
- ❖ Alexi N., Nanou E., Lazo O., Guerrero L., Grigorakis K., Byrne D.V., Check-All-That-Apply (CATA) with semi-trained assessors: sensory profiles closer to descriptive analysis or consumer elicited data? *Food Qual. Pref., in preparation*

# Thank you!

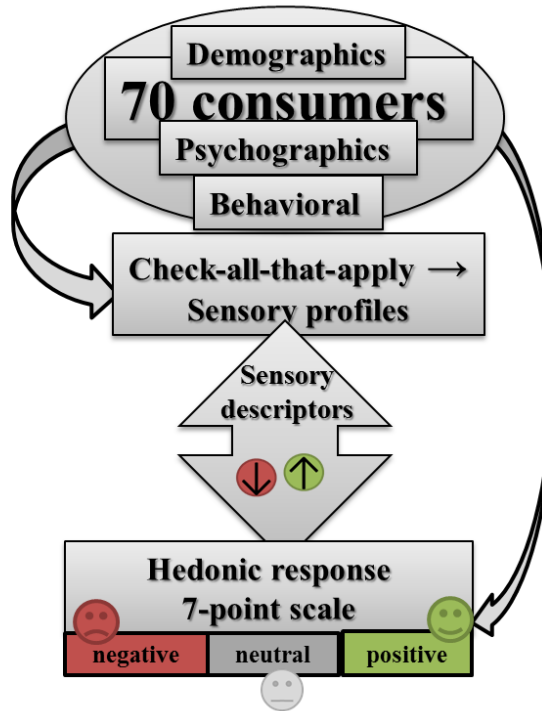
 **Wreckfish**  
*Polyprion americanus*

**Firm** ↓ **Chewy** ↓



**Earthy flavour** ↓ **Earthy odor** ↓

 **Pikeperch**  
*Sander lucioperca*



**Greater amberjack**  
*Seriola dumerili*



**Seafood odor** ↑

**Seafood flavour** ↑

**Juicy texture** ↑ **Butter flavour** ↑



**Meagre**  
*Argyrosomus regius*

