Effects of familiarization using a (fake) brand image on the performance of the A-Not A multiple difference test

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Multiple A-Not A method
– strengths and weaknesses

A-Not A method

Reference tasting

A-Not A test (3 stimuli)

For each product:
- Is this the reference or not
- How sure are you?

Strengths
-Monadic assessment
-Multiple products vs. reference
-Higher power than triangle, duo-trio and same-different tests

Weaknesses
-If subjects are not familiar enough with the reference product, some differences could not be detected

Explore more effective familiarization procedures

Objective

◎ Investigation of effects of familiarization and conceptualization using a (fake) brand image on the overall discrimination sensitivity

Hypotheses:

1) Effective familiarization procedures, experiencing the overall perception of the products to be discriminated, is needed for panels to build up stable perceptual space

2) Sequential tastings (repeated alternate tastings of two products) can enhance learning of the perceptual space

3) Providing a "fake" brand image/name could help to synthesize and conceptualize the overall perception of the product and to define the perceptual space

Procedures

◎ Stimuli: Corn soup with added salt

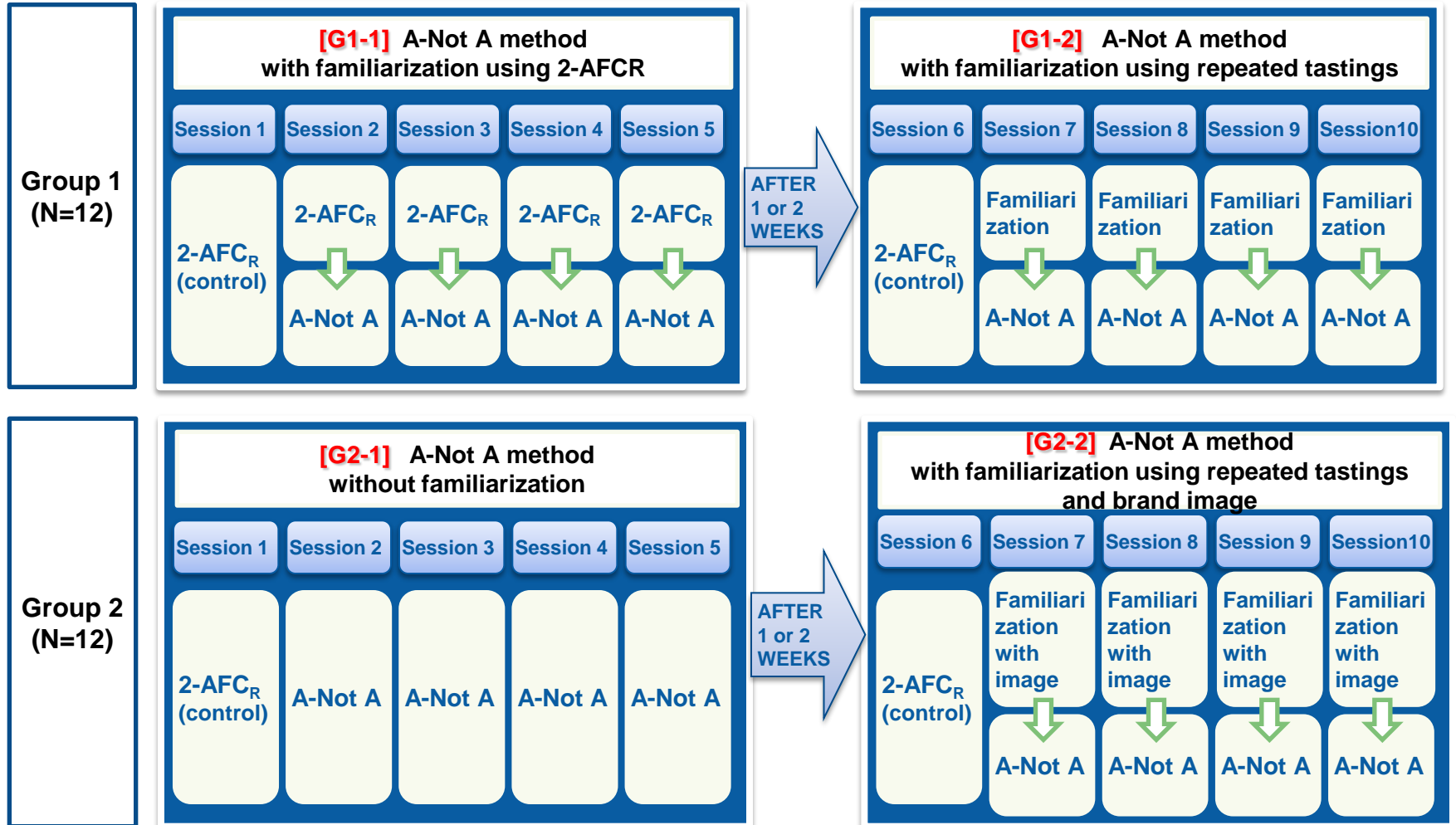3 stimuli in comparisons:

Reference   Product 1   Product 2
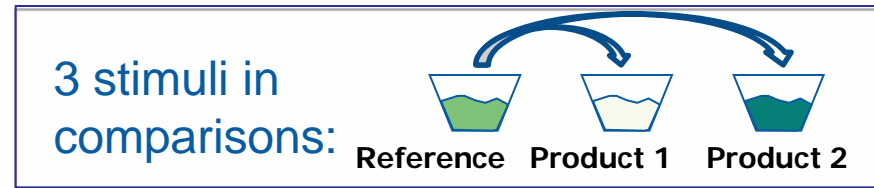
◎ Investigated discrimination method:

  ◉ A-Not A multiple difference test – before every 6 trials, only reference sample was given twice as reminder

◎ ## Familiarization methods:

  ◉ G 1-1: Difference test: 2-AFCR task

  ◉ G 2-1: Control: No additional familiarization

  ◉ G 1-2: Sequential tastings of stimuli without extra task

  ◉ G 2-2: Sequential tastings with conceptualization (brand image)

Experimental Design
using 2 groups having equivalent sensitivity

Group 1 (N=12)

[G1-1] A-Not A method with familiarization using 2-AFCR

Session 1	Session 2	Session 3	Session 4	Session 5
2-AFC$_R$ (control)	2-AFC$_R$ ↓ A-Not A	2-AFC$_R$ ↓ A-Not A	2-AFC$_R$ ↓ A-Not A	2-AFC$_R$ ↓ A-Not A

AFTER 1 or 2 WEEKS →

[G1-2] A-Not A method with familiarization using repeated tastings

Session 6	Session 7	Session 8	Session 9	Session10
2-AFC$_R$ (control)	Familiarization ↓ A-Not A	Familiarization ↓ A-Not A	Familiarization ↓ A-Not A	Familiarization ↓ A-Not A

Group 2 (N=12)

[G2-1] A-Not A method without familiarization

Session 1	Session 2	Session 3	Session 4	Session 5
2-AFC$_R$ (control)	A-Not A	A-Not A	A-Not A	A-Not A

AFTER 1 or 2 WEEKS →

[G2-2] A-Not A method with familiarization using repeated tastings and brand image

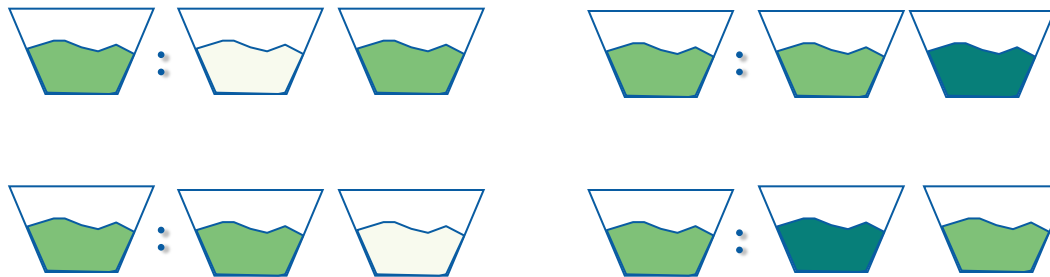| Session 6	Session 7	Session 8	Session 9	Session10
2-AFC$_R$ (control)	Familiarization with image ↓ A-Not A	Familiarization with image ↓ A-Not A	Familiarization with image ↓ A-Not A	Familiarization with image ↓ A-Not A

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Experimental Procedures

2-AFCR procedure: checking subjects sensitivity

- Session 1 and 6: all panelists performed 12 2-AFCR tests to examine their sensitivity

- According to the 1st session's results, panelists were divided into 2 groups of equal sensitivity

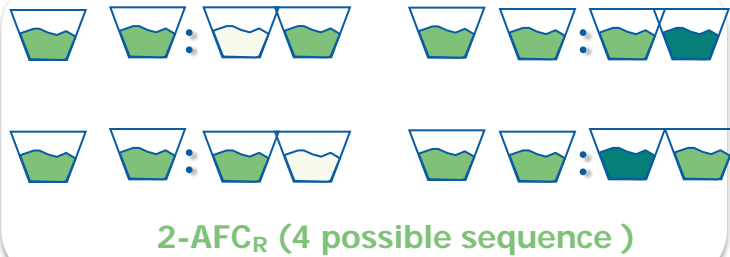**2-AFCR method**

2-AFCR (4 possible sequence)

X 3

Main test – group 1.

Group 1

Familiarization with 2-AFCR + A-Not A method

2-AFC$_R$ (4 possible sequence)

Reference tasting

A-Not A test (3 stimuli X 2 times)

X 2

X 2

Total : 32 no. of tastings for a session

After 1 or 2 weeks

Familiarization with repeated tastings + A-Not A method

Sequential Familiarization without a reference image

Reference tasting

A-Not A test (3 stimuli X 2times)

X 2

X 2

Total : 32 no. of tastings for a session

Group 2

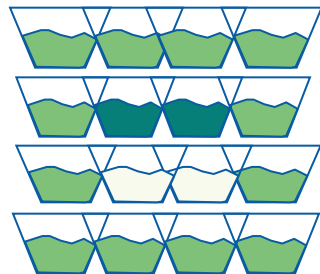## Control: No familiarization + A-Not A method

Reference tasting

A-Not A test (3 stimuli X 2 times) X 2

X 4

Total : 32 no. of tastings for a session

After 1 or 2 weeks

Familiarization with repeated tastings and brand image + A-Not A method

Sequential Familiarization with a product image for reference (ex. A fake brand name, VONO)
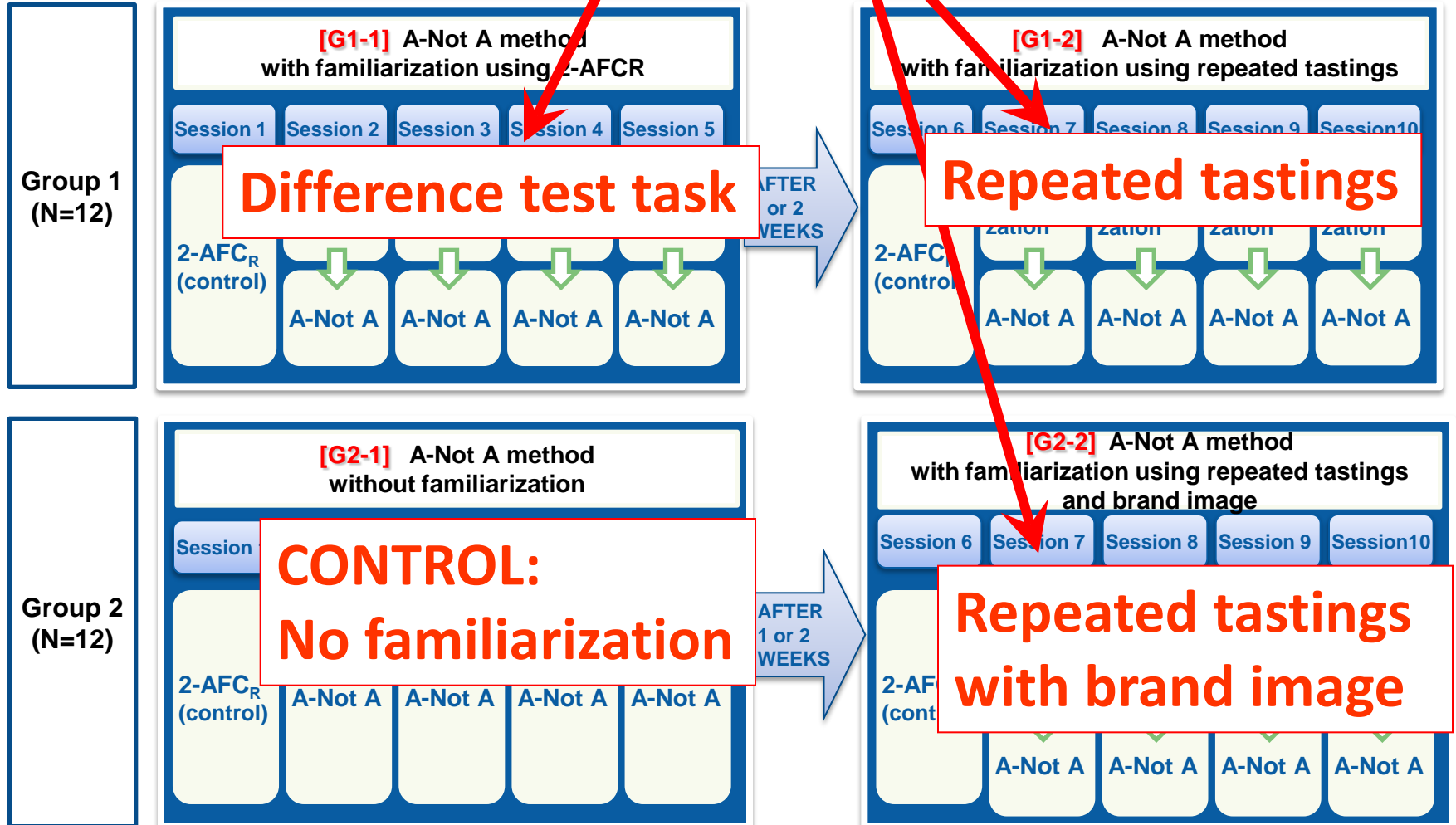
Reference tasting

A-Not A test (3 stimuli X 2times) X 2

X 2

Total : 32 no. of tastings for a session

8

Experimental Design
using 2 groups having equivalent sensitivity

Familiarization

Group 1 (N=12)

[G1-1] A-Not A method with familiarization using 2-AFCR

| Session 1 | Session 2 | Session 3 | Session 4 | Session 5 |

Difference test task

2-AFC$_R$ (control)

A-Not A   A-Not A   A-Not A   A-Not A

AFTER 1 or 2 WEEKS

[G1-2] A-Not A method with familiarization using repeated tastings

| Session 6 | Session 7 | Session 8 | Session 9 | Session10 |

Repeated tastings

2-AFC (control)

...zation   ...zation   ...zation   ...zation

A-Not A   A-Not A   A-Not A   A-Not A

Group 2 (N=12)

[G2-1] A-Not A method without familiarization

| Session 1 | ... |

CONTROL: No familiarization

2-AFC$_R$ (control)

A-Not A   A-Not A   A-Not A   A-Not A

AFTER 1 or 2 WEEKS

[G2-2] A-Not A method with familiarization using repeated tastings and brand image

| Session 6 | Session 7 | Session 8 | Session 9 | Session10 |

Repeated tastings with brand image

2-AFC (control)

A-Not A   A-Not A   A-Not A   A-Not A

Data analysis

Computation of d' estimates:

- For 2-AFCR and A-Not A the estimates of $d´$ were analyzed, as an index for the sensory differences. The rating data was fitted to receiver operating characteristic (ROC) curves using the equal variance normal model, considering the reference as noise.

Statistics for d' estimates:

- Chi^2 - tests were conducted to compare the estimates of $d´$ using IFPrograms software (The Institute for Perception, Richmond, VA, USA)
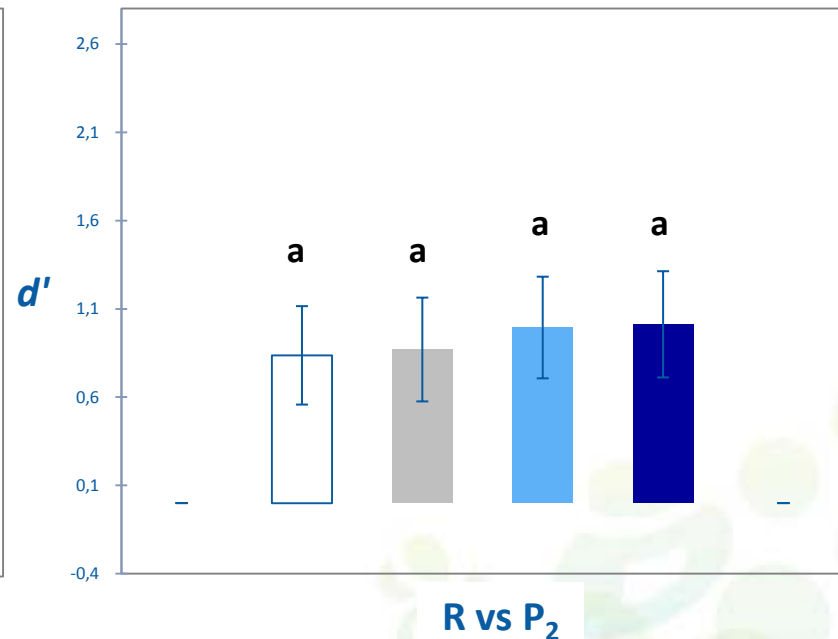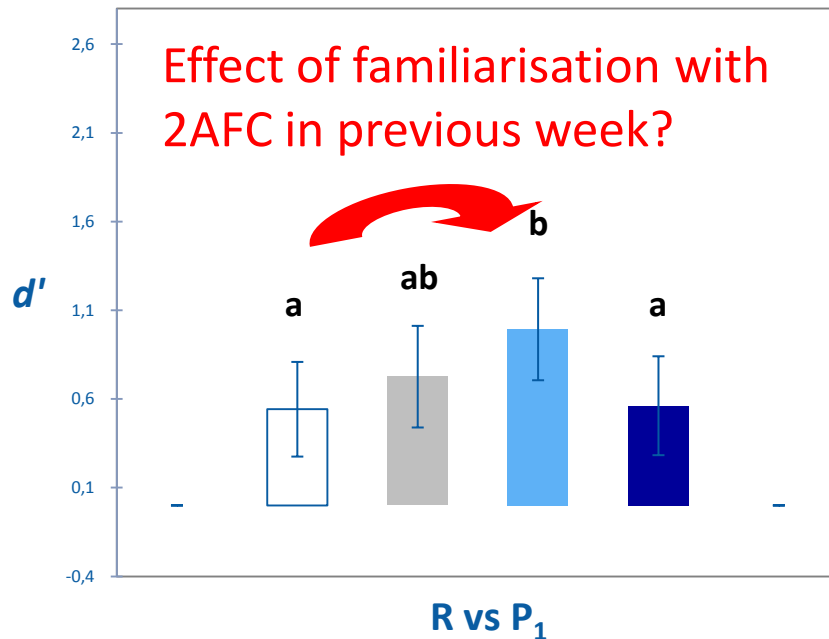
Results of sessions 1+6
– Screening judges sensitivity

Estimates of *d'* calculated from 2-AFCR results for 4 groups

□ Group 1-1 (12sets X 11subjects)

■ Group 2-1 (12sets X 10subjects)

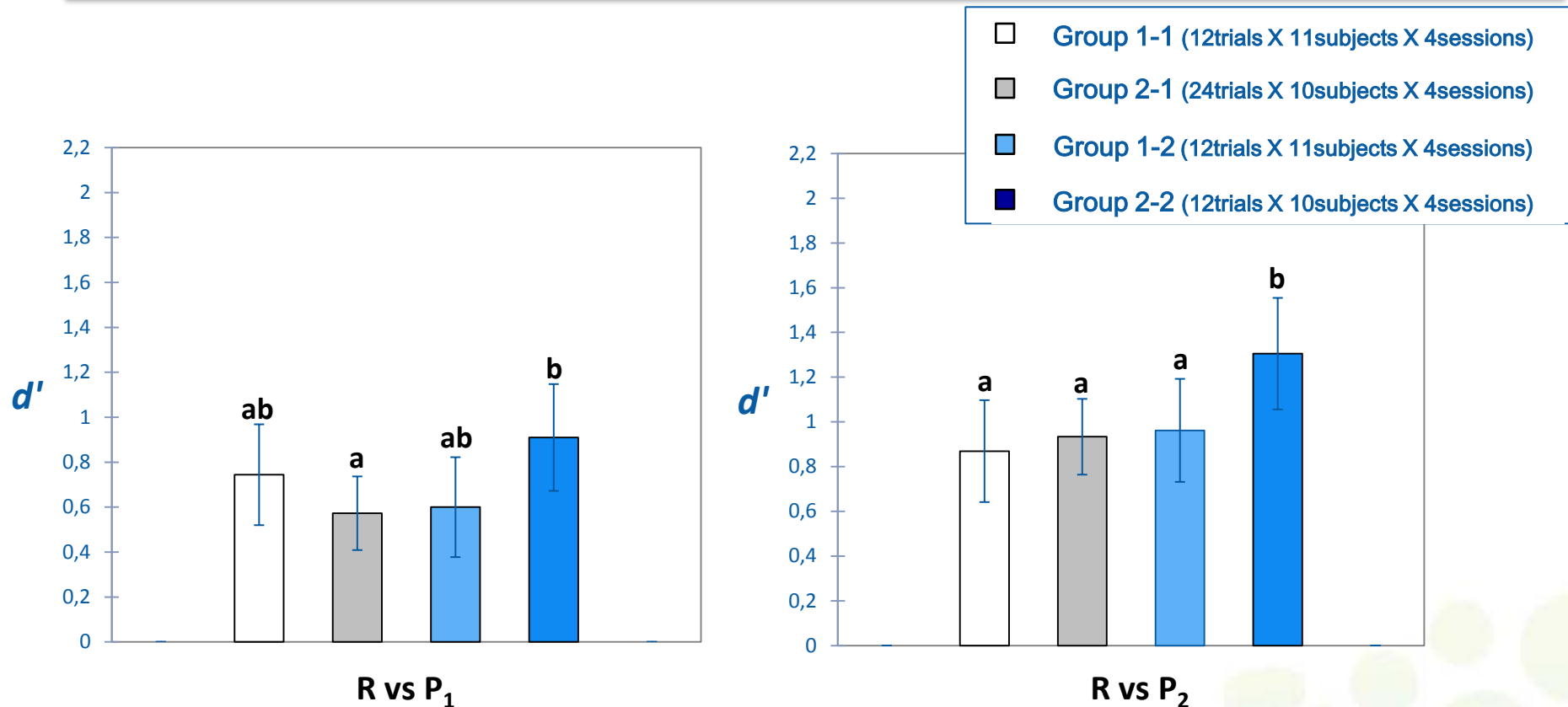■ Group 1-2 (12sets X 11subjects)

■ Group 2-2 (12sets X 10subjects)

Effect of familiarisation with 2AFC in previous week?

R vs P$_1$

R vs P$_2$

Results A-Not A
- Real test; sessions 2-4 and 7-10

Estimates of d' calculated from A-Not A results for 4 groups

☐ Group 1-1 (12trials X 11subjects X 4sessions)
◻ Group 2-1 (24trials X 10subjects X 4sessions)
◼ Group 1-2 (12trials X 11subjects X 4sessions)
◼ Group 2-2 (12trials X 10subjects X 4sessions)

R vs P_1

R vs P_2

- **The results of Group 2-2 (familiarization & brand image) showed the trend of higher d' for both test products**

Results 2-AFCR and A-Not A

Comparison between 2-AFCR (sessions 1 and 6) and A-Not A (sessions 2-5 and 7-10)

☐ 2-AFCR (All group: 12sets X 10(or11)subjects X 1 session)

■ A-Not A (G1-1,G1-2,G2-2: 12trials X 10(or11)subjects X 4 sessions,
          G2-1   : 24trials X 10subjects X 4 sessions)

R vs P$_1$

R vs P$_2$
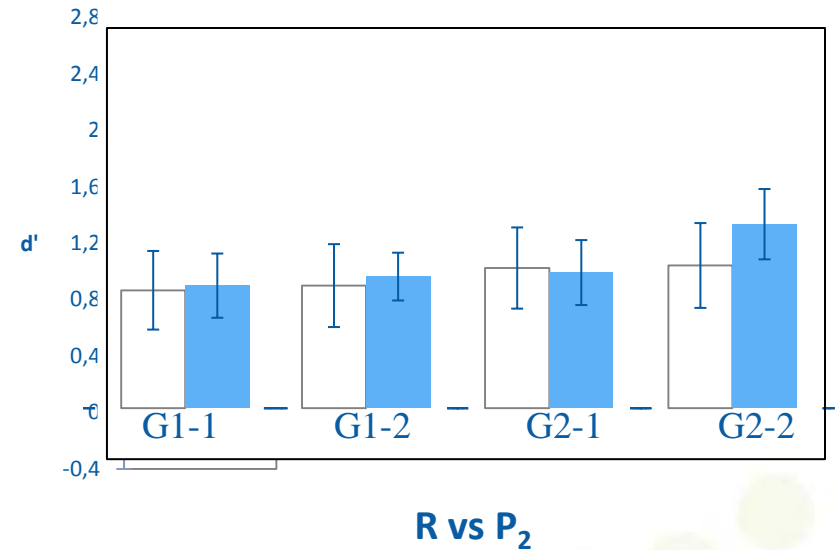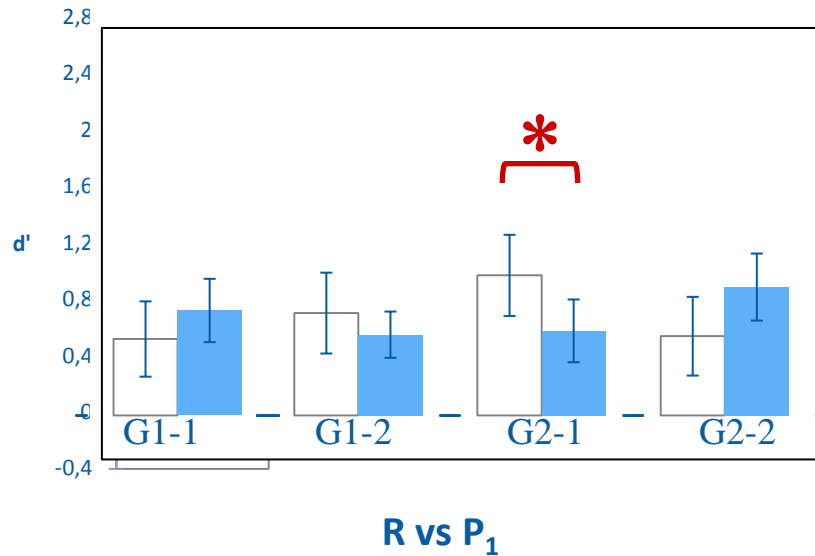
- Comparable d' estimates were obtained between 2-AFCR and A-Not A, this confirms the proposed theoretic-detection model of 2-AFCR.

Conclusions

- The results indicate that familiarization using repeated tastings of products or performing difference tests, was not efficient enough to improve subjects' discriminability in A-Not A tests

- Compared to the control condition (no familiarization), only the sequential tastings with a (fake) brand image resulted in higher d' estimates

- It seems that the use of a brand image helped subjects to synthesize and conceptually characterize the overall perception of the product and thus helped defining the perceptual space

- Such familiarization can be a useful tool for a trained panel to quickly learn the holistic sensory perception of (new) complex food products

Conclusions

- A theoretic-detection model was proposed for the 2-AFCR (Hautus, Van Hout, and Lee, 2009) and it explained that eventhough in 2-AFCR different decision strategies are possible, both can lead to similar d' estimates.

- In the present experiment, the estimates of d' were computed based on the proposed model and they were comparable to the d' estimates for the A-Not A test. This confirms that the proposed theoretic-detection model of 2-AFCR is valid and this can also be used as an overall difference test.

- The most commonly used overall difference test is the triangle test. Yet, it lacks statistical power and is prone to decision strategy shift.

- Thus, with appropriate familiarization procedure, the A-Not A and 2-AFCR protocols can be used as better alternatives to the triangle test.

Thank you