INDEX

모시는 글

안녕하십니까?

제7회 국가식품클러스터 국제 컨퍼런스가
‘Food Tech – 소비자를 위한 식품 · 음료분야 첨단 기술’을 주제로
11월 15일(수) 전북 익산 국가식품클러스터지원센터에서 개최됩니다.

2011년 이래로 국내 식품 산업 진흥과 글로벌 트렌드 공유를 위해 개최되는 본 행사는
올해 프랑스 비타고라 식품클러스터와 함께 EU의 산학연 식품특화기술을 소개하고
실용화 중심의 국내 · 외 식품 기술을 공유하는 자리를 마련하였습니다.

글로벌 식품과학기술 공유를 통해 국내 식품 산업이 한 단계 더 도약할 수 있도록,
식품 산업을 이끌어 나가시는 분들의 많은 관심과 참여 부탁드립니다.

국가식품클러스터지원센터

Greetings.

7th Foodpolis International Conference will be held at the Korea National Food Cluster Support Center in Iksan, North Jeolla Province on Wednesday, November 15. The theme of the conference is 'Advanced Technology in Fermented Food and Beverage.'

First launched in 2011, this international conference has been held to promote the Korean food industry and to share global trends. This year, the Korea National Food Cluster has joined hands with the Vitagora Food Cluster in France to share information on the EU's specialized food technologies that were developed based on industry-academia-research cooperation as well as domestic and overseas commercialization-centered food technologies.

We ask all of you leaders of the food industry to take great interest and participate in the conference, enabling the Korean food industry to take significant steps forward through the sharing of global food science technologies.

Korea National Food Cluster Support Center

컨퍼런스 개요

컨퍼런스 개요

행 사 명	제 7회 국가식품클러스터 국제 컨퍼런스
주 제	소비자를 위한 식품 · 음료분야 첨단기술
일 시	2017. 11. 15.(수), 10:30 – 18:00
장 소	국가식품클러스터지원센터 대강당 (전북 익산)
세 션	• 기조강연 : 진정한 맛, 포만감, 그리고 대사증후군 Naim KHAN / Professor & Team Leader, Team – Nutritional Physiology & Toxicology of Université de Bourgogne • 기술강연 좌장 하상도 / 중앙대학교 교수 • 기술강연 1 : 맛, 건강 그리고 지속가능한 식품 : 소비자 건강의 열쇠 Christophe BREUILLET / Managing Director • 기술강연 2 : 감각 및 소비자 과학 기술을 활용한 제품 혁신과 품질관리 이혜성 / 이화여자대학교 부교수 • 기술강연 3 : 식품성분의 혁신 : 소화기 건강과 장내미생물의 힘을 되찾다 Pascal RONFARD / President, Group SOLACTIS SAS • 기술강연 4 : 물류가 이끄는 패키징, 패키징이 이끄는 물류 김종경 / 한국건설생활환경시험연구원 팀 리더 • 기술강연 5 : 영양을 통한 건강 증진을 위한 개인 라이프 스타일 보조 : COOK2HEALTH 프로젝트 Mariette SICARD / Team Manage, Group SEB
주 최	농림축산식품부 전라북도 익산시
주 관	FOODPOLIS 국가식품클러스터지원센터
협 력	VITAGORA

제 7회 국가식품클러스터 국제 컨퍼런스

FOODPOLIS • DAY

7th FOODPOLIS INTERNATIONAL CONFERENCE

Conference Overview

Title	7th Foodpolis International Conference
Topic	Advanced Technology in Fermented Food and Beverage
Date	15th (Wed) 10:30–18:00, November, 2017
Venue	Foodpolis
Session	• **Keynote Lecture** : True Taste, Satiety and Metabolic Syndrome Naim KHAN / Professor & Team Leader, Team – Nutritional Physiology & Toxicology of Université de Bourgogne • Session Moderator Sang-Do Ha / Professor, Chung-Ang University • **Session 1** : Tasty, Healthy and Sustainable Food: The Keys to Consumer Wellness Christophe BREUILLET / Managing Director • **Session 2** : Product Innovation and Quality Management Based on Sensory and Consumer Science Hye-Seong Lee / Food Science & Engineering, ELTEC College, Engineering, Ewha Womans University • **Session 3** : Innovation in Food Ingredients: Unlocking the Power of Digestive Health and Intestinal Microbiota Pascal RONFARD / President, Group SOLACTIS SAS • **Session 4** : Logistics Packaging versus Packaging Logistics Jongkyoung (JK) Kim / Team leader, Global Business (Korea Conformity Lab) • **Session 5** : Personal Lifestyle Assistant for Better Health through Nutrition: The COOK2HEALTH Project Mariette SICARD / Team Manager, Group SEB
Hosted by	Ministry of Agriculture, Food and Rural Affairs / We Make History Jeonbuk / IKSAN CITY
Organized by	FOODPOLIS 국가식품클러스터지원센터
Cooperation	VITAGORA®

프로그램

일정	구분	프로그램
09:30-10:30	행사 등록	
10:30-10:45	개회 및 내빈소개	
10:45-11:25	기조강연	진정한 맛, 포만감, 그리고 대사증후군 Naim KHAN / Professor & Team Leader, Team - Nutritional Physiology & Toxicology of Université de Bourgogne
		기술강연 좌장 : 하상도 / 중앙대학교 교수
11:25-12:05	기술강연 1	맛, 건강 그리고 지속가능한 식품 : 소비자 건강의 열쇠 Christophe BREUILLET / Managing Director, VITAGORA
12:05-13:10	오찬	
13:10-13:50	기술강연 2	감각 및 소비자 과학 기술을 활용한 제품 혁신과 품질관리 이혜성 / 이화여자대학교 교수
13:50-14:30	기술강연 3	식품성분의 혁신 : 소화기 건강과 장내미생물의 힘을 되찾다 Pascal RONFARD / President, Group SOLACTIS SAS
14:30-14:40		**Coffee break**
14:40-15:20	기술강연 4	물류가 이끄는 패키징, 패키징이 이끄는 물류 김종경 / 한국건설생활환경시험연구원 해외사업팀장
15:20-16:00	기술강연 5	영양을 통한 건강 증진을 위한 개인 라이프 스타일 보조 : COOK2HEALTH 프로젝트 Mariette SICARD / Team Manager - Food Science, Group SEB
16:00-		**비즈니스 매칭**

*상기 프로그램은 주최측의 사정에 따라 변경될 수 있습니다.

Program

Schedule	Content	Program
09:30–10:30	Registration	
10:30–10:45	Opening Ceremony	
10:45–11:25	Keynote Lecture	**True Taste, Satiety and Metabolic Syndrome** Naim KHAN / Professor & Team Leader, Team - Nutritional Physiology & Toxicology of Université de Bourgogne
		Session Moderator: Sang-Do Ha / Professor, Chung-Ang University
11:25–12:05	Session 1	**Tasty, Healthy and Sustainable Food: The Keys to Consumer Wellness** Christophe BREUILLET / Managing Director, VITAGORA
12:05–13:10	Luncheon	
13:10–13:50	Session 2	**Product Innovation and Quality Management Based on Sensory and Consumer Science** Hye-Seong Lee / Food Science & Engineering, ELTEC College of Engineering, Ewha Womans University
13:50–14:30	Session 3	**Innovation in Food Ingredients: Unlocking the Power of Digestive Health and Intestinal Microbiota** Pascal RONFARD / President, Group SOLACTIS SAS
14:30–14:40		**Coffee break**
14:40–15:20	Session 4	**Logistics Packaging versus Packaging Logistics** Jongkyoung (JK) Kim / Team leader, Global Business (Korea Conformity Lab)
15:20–16:00	Session 5	**Personal Lifestyle Assistant for Better Health through Nutrition: The COOK2HEALTH Project** Mariette SICARD / Team Manager. Group SEB
16:00–		**Business Matching**

*Program is subject to change.

기조강연 | Keynote Lecture

True Taste, Satiety and Metabolic Syndrome
진정한 맛, 포만감, 그리고 대사증후군

Naim KHAN / Professor & Team Leader,
Team – Nutritional Physiology & Toxicology of Université de Bourgogne

기조강연

진정한 맛, 포만감, 그리고 대사증후군

나임 칸

INSERM U 1231, Université de Bourgogne/AgroSupDijon
팀 – 영양생리학 및 독물학
교수 & 팀 리더

- **학력**

1995 –	Université de Limoges	식품, 영양 및 식습관 (Habilitation)
1990 –	Université de Rennes	영양 면역학 (D. Sc.)
1985 –	Garhwal University	신경면역 생리학 (Ph. D.)

- **경력**

1997 – 현 재	Université de Bourgogne	교수/ 팀 리더
1991 – 1997	Université de Limoges	조교수
1988 – 1991	Université de Rennes	강사
1987 – 1988	Institut Neurology, 멕시코	연구원 (Research Associate)
1986 – 1987	AIIMS, 뉴델리	연구원 (Research Officer)

- **소개글**

지금까지는 단맛, 신맛, 쓴맛, 짠맛과 감칠맛이라는 5가지 맛이 존재한다고 알려져 왔다. 본 팀의 연구는 지방을 인지하는 **6번째 미각**이 존재하고 있음을 뒷받침할 뿐 아니라 본 현상에 관련 된 세포내신호전달체계를 탐구하였다. 지방 매개성 섭식행동 통제는 **비만**이나 기타 **대사이상**과 같은 일부 질병의 발병에 매우 핵심적인 역할을 한다. 본 팀의 연구는 비만 대상자의 경우 지방 맛 신호가 변형되어 있으며 CD36 다형현상이 발생함을 제시하고 있다.

적극적으로 인공 / 자연 "**미각 변형물질**"의 테스팅을 추진하고 있는 **식품-기술 산업**에 서비스를 제공할 수 있는 **기술이전부서**를 구성하였다. 실제로, 열량은 없으나 "진정한 맛"과 포만감을 느끼게 하는 새로운 분자군 모색의 핵심에 미각생리학이 있으며 이러한 연구를 통해 **비만 대상자**의 체중감량에 기여할 수 있다. 업계에서는 신규 발견된 미각자극제(tastant)에 대한 검증/평가의 기회를 모색하고 있으며 본 연구소는 이러한 물질이 대규모로 상용화 되기 이전에 감각 및 기호도 특성을 평가할 수 있는 역량과 기술을 갖추고 있는 세계적으로도 드문 연구소 중 하나이다.

현재 새로운 미각자극제(tastant)를 조성하고 있으며 양자간 협력을 통한 공동 개발 프로젝트를 제시할 수 있다.

[수상경력]

- 2012년 영양생리학 부문의 우수성을 인정 받아 프랑스 생리학 학회에서 "Robert Naquet Prize"상 수상
- 부편집장: "Frontiers in Physiology" (임팩트 팩터 4.5)

Keynote Lecture

True Taste, Satiety and Metabolic Syndrome

Naim KHAN

Team – Nutritional physiology & Toxicology
INSERM U 1231, Université de Bourgogne/AgroSupDijon
Professor & Team Leader

• Educational Background

1995 –	Université de Limoges	Food, Nutritional and Dietary Habits(Habilitation)
1990 –	Université de Rennes	Nutritional Immunology (D. Sc.)
1985 –	Garhwal University	Neuro-Immuno-physiology (Ph. D.)

• Work Experience

1997 – Present	Université de Bourgogne	Professor / Team Leader
1991 – 1997	Université de Limoges	Associate Professor
1988 – 1991	Université de Rennes	Lecturer
1987 – 1988	Institut Neurology, Mexico	Research Associate
1986 – 1987	AIIMS, New Delhi	Research Officer

• A Brief Introduction

It has been well propounded that there exists five basic taste modalities, e.g., sweet, sour, bitter, salty and umami. Our studies have not only supported the existence of the **6th taste modality**, destined for the perception of fat, but also explored the intracellular signaling mechanisms, involved in this phenomenon. The lipid-mediated regulation of feeding behavior which is very critical in the development of several diseases like **obesity** and other **metabolic disorders**. Our studies show that fat taste signaling is altered in **obese subjects** and there is a polymorphism of CD36 in obese subjects.

We have set – up a **technological transfer-unit** where we offer our services to **Food-Tech Industry** that are eagerly looking for testing the artificial/natural "**taste modifiers**". In fact, the taste physiology is at the heart for the search of new class of molecules that will bring no calories but will trigger a "true taste" and trigger satiation, and might contribute to weight loss in **obese subjects**. The industries are looking for the validation / assessment of the newly discovered tastants, and we are one of the rare laboratories in the world that are equipped with the skills and technologies to assess the sensory and hedonic properties of these agents before their large-scale commercialization.

We are also synthesizing new class of tastants and we can offer the co-development projects in a bilateral collaboration.

[Distinctions]

- In 2012, awarded the "Robert Naquet Prize" by the French Society of Physiology for excellence in the field of Nutritional Physiology.
- Associate Editor : "Frontiers in Physiology" (impact factor 4.5)

초록

진정한 맛, 포만감, 그리고 대사증후군

식이행동은 대체로 식품 기호도 특성에 따라 결정된다. 식품의 구강감각탐지 또한 식품 섭취가 증가함에 따라 중요한 역할을 담당하고 있다. 최근 일부 연구 결과와 WHO에 따르면 지방과 당을 포함하는 고칼로리 식품의 다량 섭취는 비만 및 관련 질병인 다혈증 발병에 큰 영향을 미친다. 저칼로리 감미료나 기타 다른 원료를 사용하여 식이행동을 조절, 비만을 퇴치하기 위한 업계의 전략이 다수 제안되었으나. 그럼에도 불구하고, 비만 유병율은 빠른 속도로 증가하고 있으며 관련 목표 달성과는 아직도 큰 격차가 존재하고 있다.

다음의 사안들을 다루는 기술적 플랫폼 서비스를 소개한다:

- 인공/자연 “미각변형물질”의 테스팅을 적극적으로 추진하는 식품기술기업. 열량은 없으나 “진정한 맛”과 포만감을 느끼게 하는 새로운 분자군 모색의 핵심에 미각생리학이 있으며 이러한 연구를 통해 비만 대상자의 체중감량에 기여할 수 있음
- 업계에서는 신규 발견된 미각자극제(tastant)에 대한 검증/평가의 기회를 모색하고 있음. 본 연구소는 이러한 물질이 대규모로 상용화 되기 이전에 감각 및 기호도 특성을 평가할 수 있는 역량과 기술을 갖추고 있는 세계적으로도 드문 연구소 중 하나이며
- 새로운 미각자극제 조성을 위한 공동개발프로젝트를 진행할 수 있음.

Abstract

True Taste, Satiety and Metabolic Syndrome

Eating behaviour largely depends on hedonic properties of food. Oro-sensory detection of food also plays a key role in its increased intake. During the recent past, several studies and WHO have clearly proposed that high intake of calorie – rich food, containing fat and sugar, greatly contributes to obesity and its associated diseases, called plethora disease. Many industrial strategies have been proposed to combat obesity to modulate eating behaviour by using low calorie sweeteners or other ingredients. Nonetheless, we are very far from the attainable objective as the incidence of obesity is increasing arithmetically.

The services of the technological platform will be presented, addressing:

- Food-Tech Industry players who are eagerly looking for testing the artificial/natural "taste modifiers". In fact, the taste physiology is at the heart for the search of new class of molecules that will bring no calories but will trigger a "true taste" and trigger satiation, and might contribute to weight loss in obese subjects.
- The industries are looking for the validation / assessment of the newly discovered tastants. As one of the rare laboratories in the world that are equipped with the skills and technologies to assess the sensory and hedonic properties of these agents before their large-scale commercialization
- Co-development projects in a bilateral collaboration for synthesizing new class of tastants.

"Taste, satiety and metabolic syndrome"

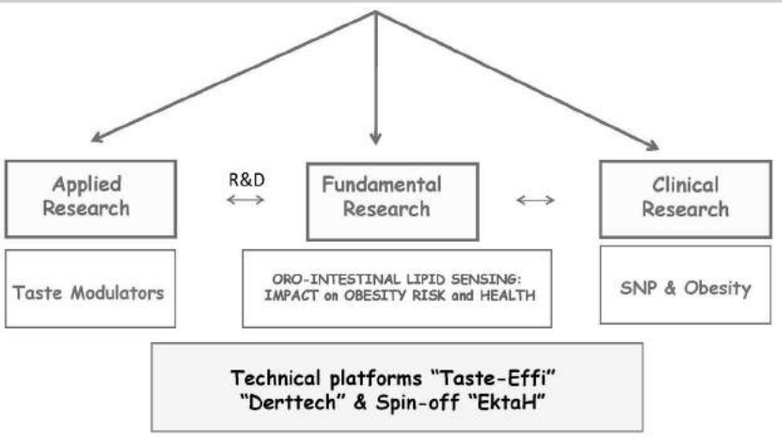
Nutritional Physiology & Toxicology (NUTox)

Director : Naim KHAN

FOODPOLIS

Vitagora French Delegation
7th International FoodPolis Conference – November 15th 2017
Advanced technologies in food and beverage for consumers well-being

NuTox Team



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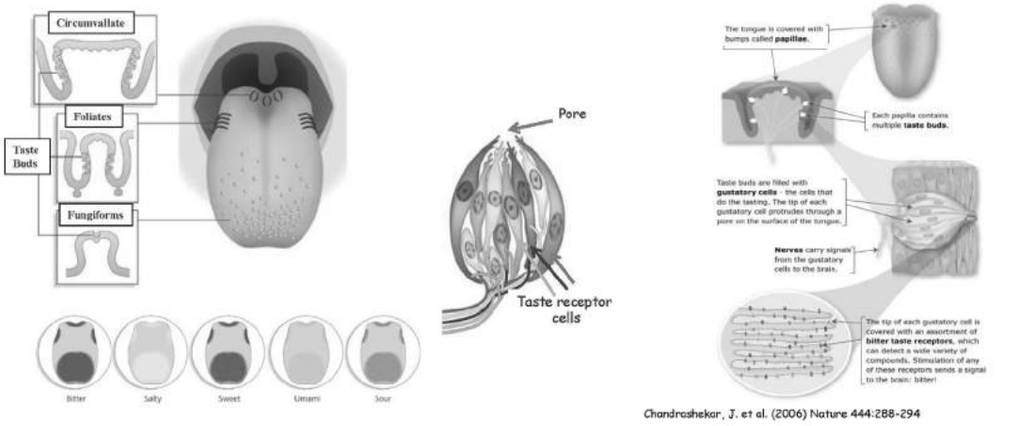
Gustatory papillae



Chandrashekar, J. et al. (2006) Nature 444:288-294

FOODPOLIS KOREAN NATIONAL FOOD CLUSTER

Vitagora French Delegation
7th International FoodPolis Conference – November 15th 2017
Advanced technologies in food and beverage for consumers well-being

Is there a fat taste ? _____

FOODPOLIS KOREAN NATIONAL FOOD CLUSTER

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Advanced technologies in food and beverage for consumers well-being

Obesity & fat preference

Obese patients exhibit a higher preference for fat than lean subjects.

Drewnowski et al., *Physiol. Behav.* 1985, 35: 617-622
Mela & sacchetti, *Am. J. Clin. Nutr.* 1991, 53: 908-915

Sensory and hedonic properties of sweet and fat vary with body mass index.

Barthoshuk et al. *Philo Trans R SocLond* 2006, 361: 1137-48

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An innate preference for fatty foods

Rats and mice spontanously prefer high fat diets
Hamilton, J. comp. Physiol. Psychol. 1964, 58: 459-60; Tzuruta et al., Physiol. Behav. 1999, 66: 285-88

Neonates feed more actively on high fat milk
Nyzenbaum & Smert Early Hum. Dev., 1982, 6: 205-13

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6th taste modality ?

4 criteria:
-Identification of a taste receptor
-Calcium signaling
-Transfer of taste message from tongue to brain
-Anticipatory physiological mechanisms

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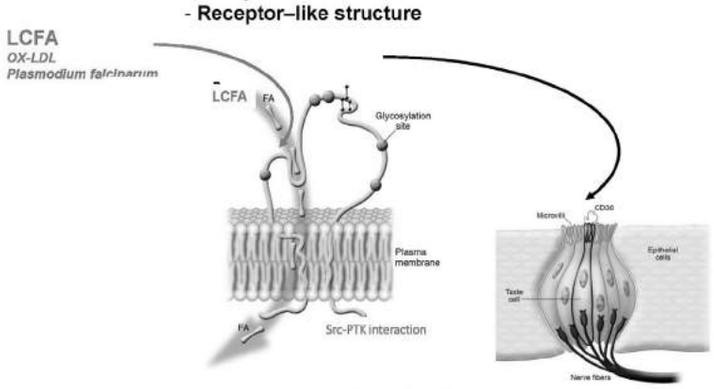
CD36 : a lipid receptor

- Multifunctional protein which belongs to the scavenger receptor family as SR-B1
- Receptor–like structure



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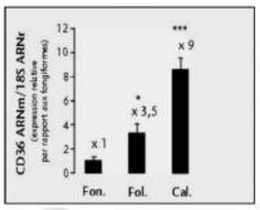
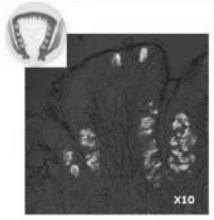
Advanced technologies in food and beverage for consumers well-being

Expression of CD36 & α-gustducin

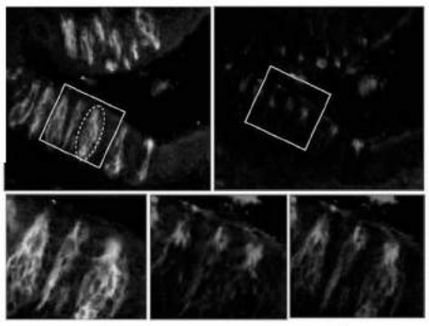
mice C57BL/6J

Laugerette F. et al. (2005) *J. Clin. Invest.* 115: 3177-3184





α-gustducin CD36



CD36 = lipido-recepteur

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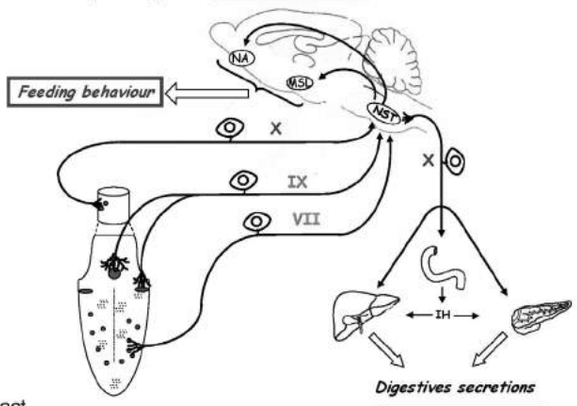
Mechanisms of taste perception



NST = Nucleus of the Solitary Tract
VII = corda tympani
IX = glossopharyngeal nerve
X = vagus nerve

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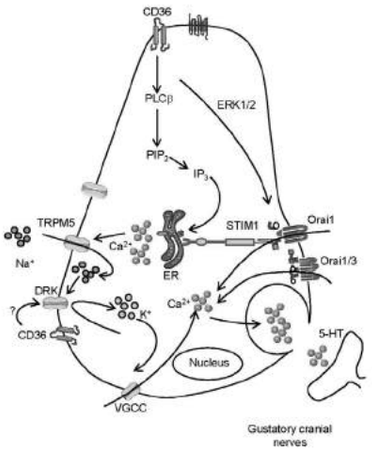
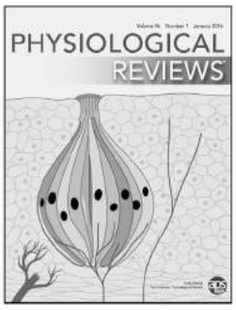
Taste for fat…





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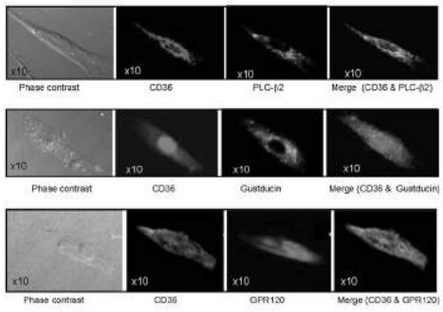
CD36 & GPR120 expression in human taste bud cells



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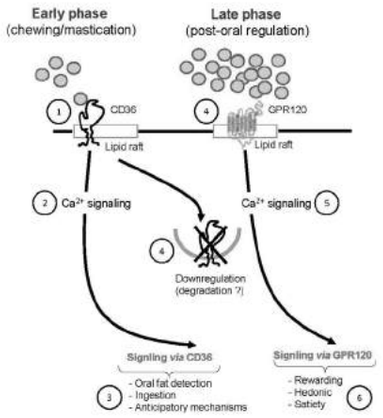

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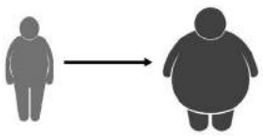
Obesity

Obesity kills 3 times more than famine in the world !

- **Food abundance**
  - ..... Nutritional imbalance (+40% of lipids)
  - ..... 600 million of people are clinically obese (OMS, 2016) (15-30% population of industrialized countries)

Factors :
Genetic, epigenetic,
cultural, textural perception
& olfactive properties...

« Junkfood » ...



.....20 % of obese till 2025

Plethora of diseases

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Decrease in dietray lipid intake:

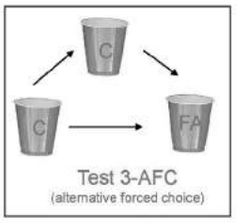
a challenge for our society

A/A genotype (rs1761667) in the CD36 : reduction of CD36 protein expression.

Humans : SNP

Obese Tunisian women
***n* = 203**

FA Sensitivity ↓ = Fat Intake ↑ = BMI ↑



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Strategies to decrease lipids in food

➡ ***"Fat substitutes"***

- ✓ *Synthetic products or lipid-derived agents*
- ✓ *Olestra (carbohydrate ester with avec 6-8 fatty acid): Caprenin, Salatrim, etc.. (saturated fatty acids, C8-C10)*

= Gastrointestinal side effects (abdominal pain), decreased absorption of vitamins and nutrients, etc..

- ✓ *0-6 kcal/g*
- ✓ *Saturated fatty acids (obesogenic)*

➡ ***"Lipid mimetics"***

- ✓ *0-4 kcal/g*
- ✓ *Saturated fatty acids (obesogenic)*

« Low calories = Low taste »
« Low calories = High taste »

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Innovator concept : *T T T*

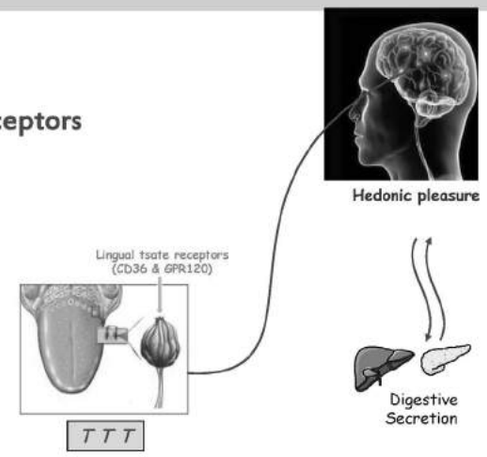
Our approach is different :

✓ *T T T* = Targeting Tongue Taste receptors

FAT-Taste Analogues

False lipids

« No calories »
« More tasty »
« Trigger fast satiation »



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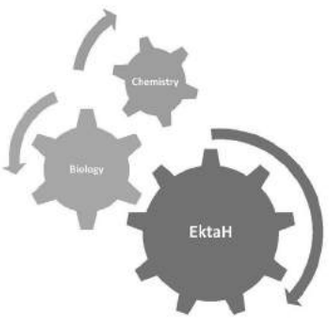
SPIN-OFF PROJECT

EKTAH
Nutritherapy is possible!

- **Physiologists - Advisor (academic):** Naim KHAN, Aziz HICHAMI
- **Chemists - Advisor (academic) :** Sylvain JUGE, Jérôme BAYARDON
- **Chemist :** Florian MANGIN
- **Biologist :** Amira SAYED-KHAN



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Our model of development

EktaH
Nutritherapy is possible!

- **Human nutrition**

  - **Dietary supplements – satiation effect**
    Bring fat-like taste (dieting formulations, low-calorie snacks, etc.)

  - **Food ingredients / functional food**

- **Pet-Food: snacking** (light)
  Improve the palatability / hedonic value (kibble)

  ✓ Very important market (... millions, billions)
  ✓ Increasing fast (+ 6%)

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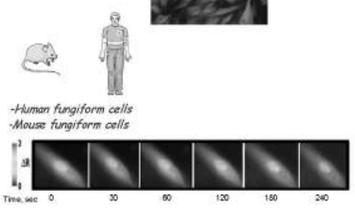
Taste-Effi

✓ No mouse and human taste bud cell lines
➢ *"Taste mimetics" or "Taste substitutes"*

« Taste enhancers / taste modifiers »

Bitter beer, Schweppes : Bitter taste enhancer.....



Taste cell line of Dog.. : pellet food... *project*

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Taste-Effi

Transfer Unit

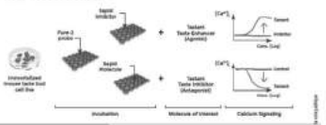
SWEETNERS
Substances giving an intense sweet taste

ENHANCERS
Catalysts enhancing gustatory perception

POTENTIATORS
Substances intensifying the sweet and long lasting taste

First taste modulator screening assay on immortalized mouse fungiform taste bud cells.

How does it work ?



We can provide :

-Cell signaling mechanisms (Ca^{2+} signaling…), T2R38, T1R2, T1R3, etc
-Agonists / antagonists (inverse agonist)…
-Receptology (interaction Ligand -Receptor) : Kd, Bmax, Ki etc…

Our services can be extended to *in vivo* testing

- Palatability test (Lickometer)
- Liking/preference test (Double choice test)
- Wanting test (Gustometer)
- *In vitro* metabolism

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Taste-Effi

Conception → Synthesis → Screening *in vitro* → *in vivo* → *Formulation* → *Marketing* → Public

Taste-Effi (we are here…)

We accompany you……
from in vitro to in vivo

You synthesize… We analyse….

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Metabolic phenotyping

Body composition: Echo MRI

Without anesthesia, we can determine

- Fat mass
- Lean mass
- Water body contents

Energy density: oxygen bomb calorimeter

Calorific value of Various samples

Energy expenditure: calorimetric cages CLAMS

Respiratory exchange ratio, activity, food and water intake

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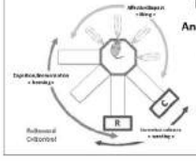
Behavioral phenotyping

Conditioned place preference cages

Evaluation of putative addictive behavior

FoodRewardMeter

Analysis of reward modalities:
Liking (Gustometer)
Wanting (Incentive runway)
Learning (radial maze)



Open field

Exploration of the adaptation capacity to a new environment

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Toxicological assessment

Partners / funding : Danone, Pierre Fabre, ADEME, Limagrain, etc.

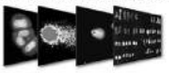
✓ *Specialized in hazard assessment of food contact materials*

Paper-board, plastics, coatings, varnish, adhesives.

Low dose, mixture chronic exposure →

-Endocrine disruption (e.g., obesity)
-Cyto/genotoxicity
-Cell proliferation, apoptosis

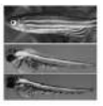
✓ *Expertise on global toxicological risk assessment*
In vitro bioassays for cytotoxicity, genotoxicity, (Ames test, micronucleus..), endocrine disruption (gene reporter assays) according OECD guidelines,



✓ *Development of new biomarkers*
***Zebra fish embryo** test (in vivo model of toxicological studies)*

✓ *This model fulfils "OECD Level 4" recommendations for ED*
✓ *Model for detection of obesogenic properties*

Zebra fish model is a part of core facility at INSERM U1231 LNC
"Listed as Competent Organism of EFSA"



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Acknowlegmements

Gado Dramane, Abdoulghani El-Yassimi, Souleymane Abdoul-Azize, Aziz Hichami, Philippe Besnard and Naim Akhtar Khan
UPRES EA 4183 Lipides & Signalisation Cellulaire / INSERM UMR 866 Nutox, Dijon

Simon Akpona
Laboratoire de Biochimie, Université de Parakou, Parakou, Bénin

Timo Vögtle, Bernhard Nieswandt
Rudolf-Virchow-Center, DFG Research Center for Experimental Biomedicine, University of Würzburg, Würzburg, Germany

Hassimi Sadou
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Ahmed-El Hadj Koceir, Feriel Atek,
USTHB, Algiers, Algeria

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Notre dame

La Chouette
Dijon, France

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경청해 주셔서 감사합니다.
Thank you for your attention

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기술강연 좌장 | Session Moderator

하상도 / 중앙대학교 교수
Sang-Do Ha / Professor, Chung-Ang University

기술강연 좌장

하 상도

중앙대학교 식품공학부

교수

- **학력**

1991 - 1994	미국 Texas A&M Univ.	이학박사
1989 - 1991	중앙대학교 식품공학과	대학원 석사
1985 - 1989	중앙대학교 산업대학	식품공학과

- **경력**

2016 - 현 재	(사)한국식품안전협회	부회장
2013 - 현 재	국무총리실 식품안전정책위원회	전문위원
2013 - 현 재	소비자시민모임	이사
2013 - 현 재	한국식품위생안전성학회	부회장
2006 - 현 재	식약처 식품위생심의위원회	위원
2003 - 현 재	중앙대학교 생명공학대학	식품공학부 교수
1999 - 2003	한국보건산업진흥원	수석연구원

- **소개글**

1. 대한민국 근정포장 (제77995호) (2007. 5. 14) : 2007년 식품안전의 날 유공자포상
2. 학술상 (2006.11.17 (사단법인) 한국식품위생안전성학회)
3. 학술진보상 (제2007-49호) (2007.6.21 (사단법인) 한국식품과학회)
4. 서울특별시지방경찰청장 감사장 (2014.10.21. 69주년 경찰의날, 제274호)
5. 학술상 (중앙대학교 제2015-459호, 2015. 10. 11)
6. 우수논문피인용상 (2016.8.18 (사단법인) 한국식품과학회)
7. Distinguished Scholar (2017.3.1-2019.2.28 중앙대학교)

Session Moderator

Sang-Do Ha

Chung-Ang University

Professor

- **Educational Background**

1991 – 1994	Texas A&M Univ.	B.A. degree in Dept. Food Sci. & Technol.
1989 – 1991	Chung-Ang Univ.	M.A. degree in Dept. Food Sci. & Technol.
1985 – 1989	Chung-Ang Univ.	Ph.D. degree in Food Science & Technology Program

- **Work Experience**

2016 – Present	Korean Institute of Food Safety	Vice President
2013 – Present	Committee of Food safety Policy, Office of the Prime Minister, Korea	Expert Member
2013 – Present	Consumers Korea	Member of Board of Directors
2013 – Present	Korean Society for Food Hygiene and Safety	Vice President
2006 – Present	Food Safety Consulting Committee, Ministry of Food and Drug Safety, Korea	Consultant member
2003 – Present	Chung-Ang University	Professor
1999 – 2003	Korea Health Industry Development Institute(KHIDI)	Head researcher

기술강연 1 | Session 1

Tasty, Healthy and Sustainable Food: The Keys to Consumer Wellness
맛, 건강 그리고 지속가능한 식품 : 소비자 건강의 열쇠

Christophe BREUILLET / Managing Director

기술강연 1

맛, 건강 그리고 지속가능한 식품 : 소비자 건강의 열쇠

크리스토프 브레일렛

Vitagora
상무이사

- **학력**

1999 – 2001	AgroSup Dijon	식품공학
1997 – 1998	Université de Toulouse III	생명과학

- **경력**

2006 – 현 재	Vitagora	상무이사(Managing director)
2004 – 2006	Normandie Plats Cuisinés	산업담당이사(Industrial director)
2001 – 2004	Centrale Alimentaire Carrefour France	QA 매니저

- **소개글**

크리스토프 브레일렛(Christophe BREUILLET)는 Vitagora 식품산업 클러스터 상무이사는 2006년 프로젝트매니저(Project Manager)로 Vitagora에 입사하였으며 2007년 이후 현재까지 상무이사(managing director)로 근무하고 있다.
식품기술 엔지니어인 크리스토프 브레일렛(Christophe BREUILLET)는 Carrefour 그룹 내 프랑스 식품 사업부에서 본인의 커리어를 시작하였다. 이후 Normandie Plats Cuisiné(직원 120명 규모의 RTE 식사 전문 기업)에서 산업담당이사(industrial director)로 근무하면서 회사 내 신규 생산부서를 구성하는 중요한 업무를 담당하였다.
그가 Vitagora에 관리자로 조인한 후 클러스터는 170개 이상의 공인 된 혁신 프로젝트 및 370개 이상의 회원으로 구성 된 역동적인 국제 네트워크를 구성하는 중요한 성과를 달성했으며, 또한 2015년에는 우수 클러스터 관리 부문에서 Gold Label을 획득했다.

Session 1

Tasty, Healthy and Sustainable Food: The Keys to Consumer Wellness

Christophe BREUILLET

Vitagora

Managing Director

- **Educational Background**

1999 – 2001	AgroSup Dijon	Food engineering
1997 – 1998	Université de Toulouse III	Life sciences

- **Work Experience**

2006 – present	Vitagora	Managing director
2004 – 2006	Normandie Plats Cuisinés	Industrial directo
2001 – 2004	Centrale Alimentaire Carrefour France	Quality assurance manager

- **A Brief Introduction**

Christophe BREUILLET is the managing director of the Vitagora food industry cluster. He joined Vitagora in 2006 as project manager, and has assumed the role of managing director from 2007 onwards.

A food technology engineer, Christophe BREUILLET began his career within the Food Division France of the Carrefour group. He subsequently joined the company Normandie Plats Cuisiné (120 employees, specialised in ready-to-eat meals) in the role of industrial director, where he was most notably in charge of the construction of a new manufacturing unit for the company.

Since he took the reins of Vitagora, the cluster has reached a milestone of more than 170 accredited innovation projects, as well as building a dynamic international network of over 370 members, and was awarded the Gold Label in cluster management excellence in 2015.

초록

맛, 건강 그리고 지속가능한 식품 : 소비자 건강의 열쇠

비타고라(Vitagora)는 프랑스의 버건디 프랑슈콩테 지역과 파리 지역에 위치한 선도적 식품혁신 클러스터이다. 비타고라의 독특한 전략은 “건강에 좋고, 맛있고, 지속 가능한 식품이라는 소비자들과의 약속에 초점을 맞춤으로써 웰빙에 대한 소비자의 점증하는 요구에 부응할 식품 제품군을 만드는데 전력하는 것이다.

최근 10년 동안 비타고라는 공동 혁신 프로젝트의 출현을 지원하기 위해서 기업들과 농업전문가들을 다양한 과학 및 기술 분야의 전문가 네트워크와 연결시킨 역동적 식품혁신생태계를 조성했다. 이들 프로젝트 중 하나는 “식품과 식단이 웰빙에 미치는 영향을 어떻게 측정할 것인가?”라는 매우 중요한 문제를 다루었다. 다수의 다국적 식품회사들이 참여한 이 프로젝트는 건강한 인구집단들에서조차 웰빙 측정을 위해 생리적 및 심리사회적 표지자(markers)들을 결합시킨 혁신적 설문지를 개발했다.

Abstract

Tasty, Healthy and Sustainable Food: The Keys to Consumer Wellness

Vitagora is a leading food innovation cluster based in the French regions of Burgundy–Franche–Comté and the Paris region. Its unique strategy focuses on creating a food offer that responds to growing consumer demands for wellbeing, by focusing on the "consumer promises of food that is healthy, tasty and sustainable.

In 10 years, Vitagora has built a dynamic food innovation ecosystem bringing together businesses and agriculturalists into contact with a diverse network of scientific and technology experts to support the emergence of joint innovation projects. One of these projects has addressed a central problem: how to measure the influence of food and diet on wellbeing? This project, involving a number of multinational food businesses, has developed an innovative questionnaire combining physiological and psychosocial markers for measuring wellbeing, even in healthy populations.

Tasty, healthy and sustainable food

The keys to consumer wellness

Anne-Céline Renaud
International development manager, VITAGORA

FOODPOLIS
KOREAN NATIONAL FOOD CLUSTER

Vitagora French Delegation
7th International FoodPolis Conference – November 15th 2017
Advanced technologies in food and beverage for consumers well-being

Vitagora + FoodPolis – 7 years of collaboration

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Tasty, healthy and sustainable food for consumer wellbeing

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Wellbeing through food – an original strategy

Food as a source of
Wellbeing
The alliance of 3 consumer promises:
taste, health, sustainability

of consumers

A segmentation approach
requiring expertise in consumer sciences

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Building an active and quality network

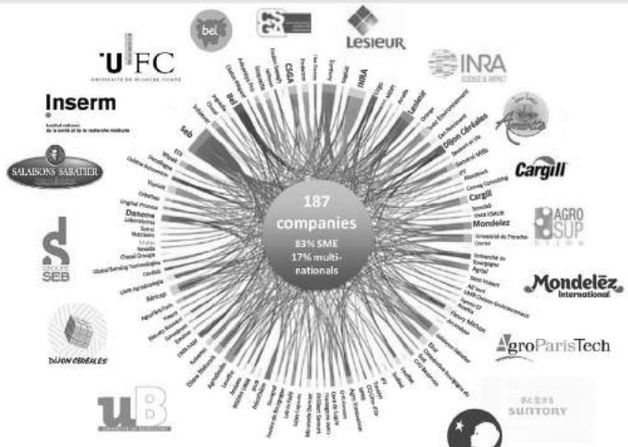
370 active members

INDUSTRY

RESEARCH

HIGHER EDUCATION

170 Innovation projects



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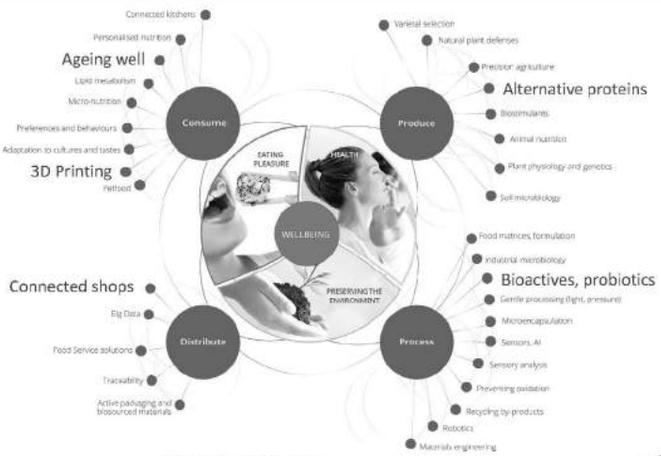
Gathering a powerful pool of experts

A techno-scientific knowledge network...

12,500
scientists and engineers in food and health sciences.
And a network of expert SMEs.

... applied to food business challenges ...

From farm to fork



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Food for Wellbeing - Experts and actions

Pr NAIM KHAN

Professor of nutrition physiology

University of Burgundy

"Taste, satiety and metabolic syndrome"

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Food for Wellbeing - Experts and actions

Mr PASCAL RONFARD

President

Solactis Group

"Unlocking the power of digestive health and intestinal microbiota"

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Food for Wellbeing - Experts and actions

Dr MARIETTE SICARD
Mr NICOLAS VALANCE
SEB Group

"A personal lifestyle assistant for better health through nutrition"

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Wellbeing – a measurable concept?

How does
Food
influence
Wellbeing?

3 year R&D project

SEB · sodexo · Mondelēz International · DANONE · ROQUETTE Offering the best of nature · Eurial EURIAL ULTRA FRAIS · LESIEUR

Wellbeing – a measurable concept?

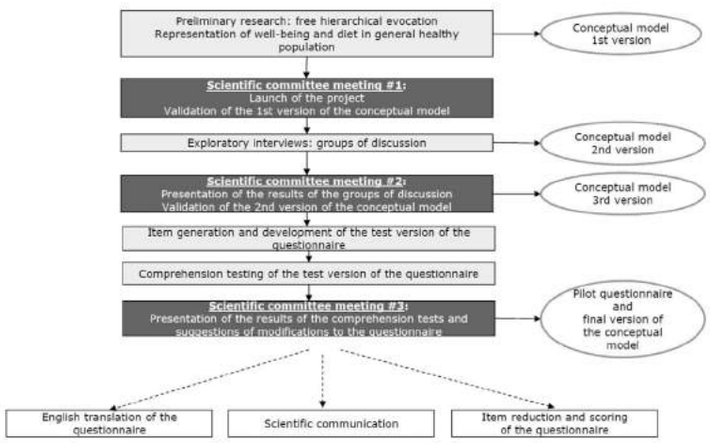
How does **Food** influence **Wellbeing?**

3 year R&D project

Goal:
To develop an **objective methodology** for evaluating **wellbeing through food.**

Innovation:
Combine **psychological** and **physiological** approaches

Wellbeing – a measurable concept?



FOODPOLIS KOREAN NATIONAL FOOD CLUSTER

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Wellbeing – a measurable concept?

How does
Food
influence
Wellbeing?

Results:
WELL-BFQ questionnaire

178 item, modular questionnaire
Covering all aspects of perception of diet
Pleasure, Food safety, Relaxation, Digestion and satiety
Energy and psychology

Can measure effet of
one food item or **overall diet**

Scientifically validated using
wellbeing biomarkers

Vitagora – food innovation for consumer wellbeing

A leading food innovation cluster
Created in 2005 from scratch. In 2017, **a dynamic ecosystem** of members and support organisations.

A focus on consumer wellbeing – a winning strategy
The development of a toolbox and innovation methodology applied to detecting and developing emerging markets for high value foods

A regional base, an international outlook
International operations perfectly integrated into cluster strategy in phase with needs of international markets

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경청해 주셔서 감사합니다.
Thank you for your attention
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기술강연 2 | Session 2

Product Innovation and Quality Management Based on Sensory and Consumer Science

감각 및 소비자 과학 기술을 활용한 제품 혁신과 품질관리

이혜성 / 이화여자대학교 부교수

기술강연 2

감각 및 소비자 과학 기술을 활용한 제품 혁신과 품질관리

이 혜성

이화여자대학교 신산업융학대학 식품영양학과

부교수, 공학융합연구소장

- **학력**

2017 –	**연세대학교 경영전문대학원**	Corporate MBA
2003 –	**University of California, Davis**	식품공학 박사 (감각과학 부문에 역점)
1998 –	**이화여자대학교**	식품영양학 이학석사 (식품학 부문에 역점)
1996 –	**이화여자대학교**	식품영양학 이학사

- **경력**

2014 – 현 재	**이화여자대학교**	식품영양학과 부교수
2008 – 2014	**이화여자대학교**	식품영양학과 조교수
2006 – 2008	**이화여자대학교**	식품영양학과 연구교수
2005 – 2006	**네덜란드 Vlaardingen, Unilever 연구소**	소비자 연구원, 소비자 지각 및 행동

- **소개글**

이화여자대학교 식품영양학과 부교수로 재직하고 있는 이혜승 교수는 감각과학 및 소비자학 부문의 강의와 연구에 폭넓은 경험을 보유하고 있다. 이혜성 교수는 소비자 지각에 대한 보다 심도 있는 이해를 가능하게 하는 새로운 방법론의 모색에 초점을 두고 감각과학 및 소비자행동을 연구하고 있다.

Session 2

Product Innovation and Quality Management Based on Sensory and Consumer Science

Hye-Seong Lee

Food Science & Engineering, ELTEC College of Engineering,
Ewha Womans University

Associate Professor and Director of the Center for
Convergence Research of Advanced Technologies

- **Educational Background**

2017 –	Yonsei Graduate School of Business	Corporate MBA
2003 –	University of California, Davis	Ph. D, Food Science (with emphasis on sensory science)
1998 –	Ewha Womans University	MS, Foods & Nutritional Science (with emphasis on food science)
1996 –	Ewha Womans University	BS, Foods & Nutritional Science

- **Work Experience**

2014 – Present	Ewha Womans University	Associate Professor, dept. of Food Science & Engineering
2008 – 2014	Ewha Womans University	Assistant Professor, dept. of Food Science & Engineering
2006 – 2008	Ewha Womans University	Research Professor, dept. of Food Science & Engineering
2005 – 2006	Unilever R&D Vlaardingen	Consumer Scientist, Consumer Perception and Behavior

- **A Brief Introduction**

Hye-Seong Lee is Associate Professor in the Department of Food Science and Technology at Ewha Womans University. She has extensive experience in teaching and research in sensory and consumer science.
Her research areas are sensory science and consumer behavior, with a main focus on the exploration of new methodologies to further understanding consumer perception.

초록

감각 및 소비자 과학 기술을 활용한 제품 혁신과 품질관리

감각 및 소비자 과학은 식품과학기술과 관련된 4가지 핵심 과학 분야 중 하나로, 가장 최근에 급속히 발전하고 있는 신과학기술 분야이다. 초기에는 훈련된 감각 평가원들을 활용하여 식품의 감각적 특성들을 분석하고, 식품기술자들에게 식품 품질관리와 제품 최적화를 위한 식품정보를 제공하는 실험실 연구에 기초해 발전하였다. 이 과정에서 분석적인 차이식별검사, 묘사분석 방법, 소비자 기호도 평가 방법들이 주로 활용되었다. 그러나 최근 소비자의 감각과 지각, 그리고 인지와 행동 이해가 비즈니스 중심 이슈로 떠오르면서 감각 및 소비자 과학으로 폭넓게 확장되어 발전되고 있다. 특히 식품관련 비즈니스에서 소비자가 감각/지각하는 제품 경험에 대한 이해는 식품 혁신과 전략적 품질관리 프로그램 운영의 기본 틀을 결정한다. 따라서 최근 소비자들의 감각 경험에 대한 만족도를 높이고 또한 건강한 식생활을 도모하기 위하여, 새로운 또는 개선된 감각 측정 방법들이 활발히 연구되고 있다.

본 발표에서는 이러한 최근 트렌드에 초점을 맞추어, 먼저 서론적으로 소비자의 감각 평가와 관련한 두 단계의 정보처리 과정 – 소비자 감각/지각 과정과 정보 결정과정 – 을 리뷰하고 감각 측정을 더 타당성 있게, 신뢰성 있게 연구할 수 있는 방안에 대해서 논의해 보고자 한다. 또한 최근 중요시되는 다양한 비즈니스 목적을 두 개의 파트로 나누어 보고, 각 파트에서 앞서 제시된 측정 방법론적 이슈들에 대해 어떻게 해결방안을 찾고 있는지에 대해서, 감각 및 소비자 과학의 최근 연구 동향을 본 연구실의 연구결과를 중심으로 다루어 보고자 한다.

1) Part I: 전략적 기업 감각 품질 관리 – 소비자 감각 차이식별 방법과 선호도 측정 방법 및 소비자 제품 수용도/개념 만족도 평가 방법의 활용법. Part I 에서는 소비자 제품식별력 및 제품수용도 차이분석방법이 어떻게 더 예민하게 식별력이 높아질 수 있는지 논의될 것이다.

2) Part II: 소비자 중심의 제품/패키지 디자인과 감각 마케팅 – 제품 사용 시의 소비자 감각적 경험 측정 방법과 소비자 행동 측정방법의 활용법과 이를 통한 커뮤니케이션 전략 개발방법. Part II 에서는 새로 개발된 'double-faced applicability' test method 에서 어떻게 정성적인 소비자 연구방법과 정량적인 탐지이론이 융합되어 소비자 감각 정량화를 실현하였는지 소개하고, 이산 선택 실험과 동시 진행되는 eye-tracking 기술의 활용에 대해서도 소개될 것이다.

Abstract

Product Innovation and Quality Management Based on Sensory and Consumer Science

Sensory and consumer science is one of the four core sciences in food science, and the most rapidly growing new science-technology in recent days. Initially sensory and consumer science was developed by analyzing sensory properties leveraging the food technologists, and it was based on lab research providing food technologists information on food properties for quality control and product optimization. In this process, sensory methods such as analytical sensory difference tests, laboratory descriptive sensory analysis and consumer acceptance tests were mostly employed. Yet, during the last decades the scope of sensory science has been rapidly broadened and expanded to sensory and consumer science, as understanding on consumer' s sensation, awareness, perception and behavior emerge as key issue of business. In particular, understanding on product experience sensed/perceived by consumer decides the framework of the food innovation and of the operation of strategic quality management program. Accordingly new and improved sensory measurement methods are being actively studied in order to improve satisfaction of consumers' sensory experience and to promote healthy eating.

Focusing on these recent trends, in this talk, two-staged information processing process related to consumer' s sensory assessment – consumer sensory/perception process and information based decisional process – is reviewed, which is followed by discussion on methodological issues of studying sensory measurement in more valid and reliable way. Afterwards, various business objectives are grouped in two parts, and with focus on research of the Lab, recent developments in sensory and consumer science each parts are introduced, regarding how issues in proposed measurement methodologies are being resolved:

1) Part I: Strategic Corporate Sensory Quality Management – application of sensory difference/preference measurement method and sensory acceptance/concept satisfaction test methods. In this part, it will be discussed how the product discrimination and acceptance analysis methods become more discriminating.

2) Part II: Consumer-driven Product/Package Design and Sensory Marketing – applications of consumer perceptual experience measurement, consumer behavior measurement and developing communication strategy. In this part, a newly developed research method called 'Double-faced applicability' test method, which achieved the quantification of consumer perception by integrating qualitative consumer research and quantitative signal detection modeling approach is introduced. Eye-tracking technique applied together with the discrete choice experiment is also discussed.

7th FOODPOLIS International Conference
제7회 국가식품클러스터 국제컨퍼런스

Product Innovation and Quality Management Based on Sensory and Consumer Science

Nov 15, 2017

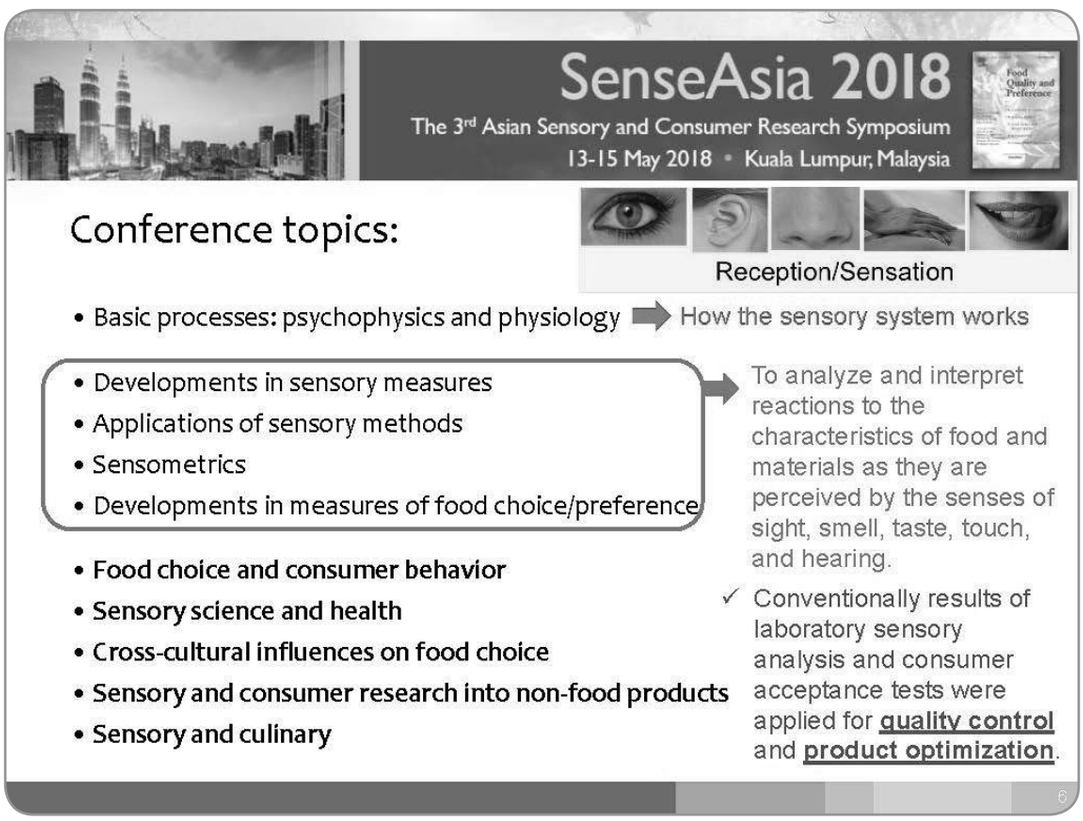
Hye-Seong Lee, Ph.D. MBA
Associate Professor of Dept. Food Science & Engineering
Food Design/Ergonomics Lab.
Ewha Womans University, Republic of Korea
이화여자대학교 EWHA WOMANS UNIVERSITY

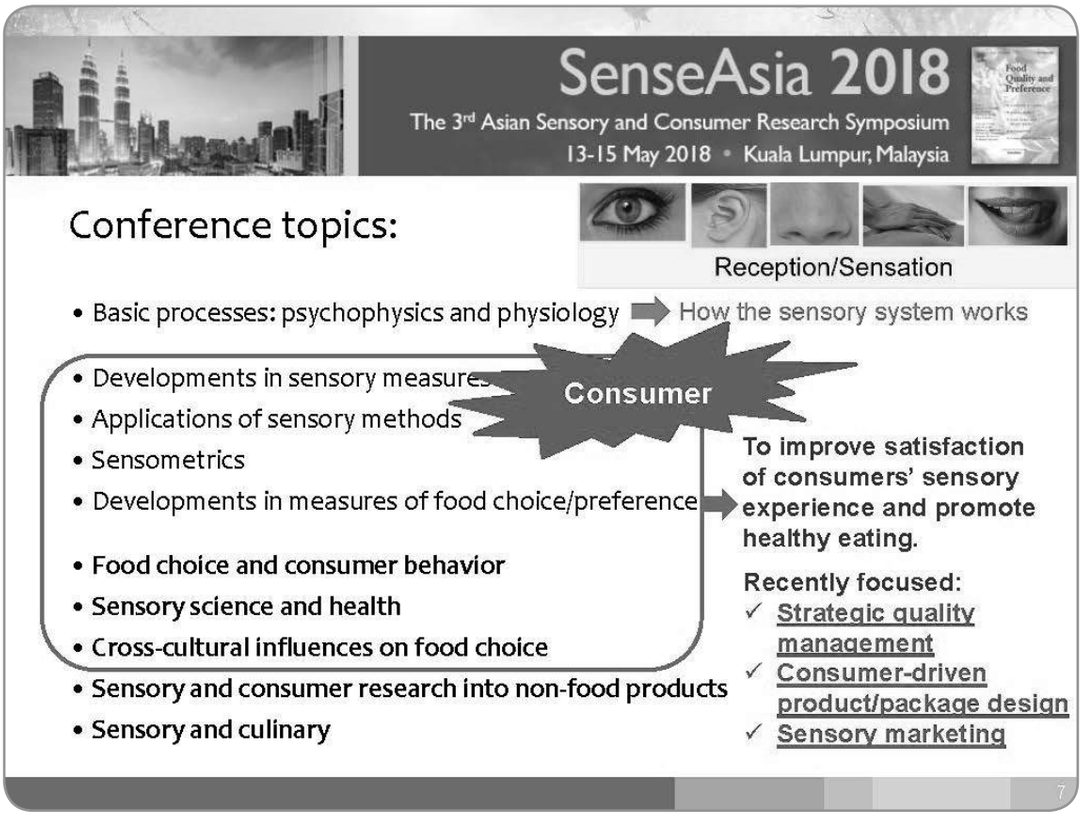
Contents


Introduction


Introduction
SENSORY AND CONSUMER SCIENCE


Sensory and Consumer Science: One of Four Core Sciences in Food Science Training
IFT
feeding the minds that feed the world
My Community | About Us | News Room | Annual Meeting & Food Expo
Knowledge Center
Food Technology
Membership
Meetings & Events
Public Policy & Regulations
Career Center
Marketplace
Community
Explore the Core Sciences...
Browse Online Courses
Join the Discussion
Focus Areas
Core Sciences
Food Chemistry
Food Engineering
Food Microbiology
Sensory and Consumer Sciences
Read IFT Publications
Science Reports
Attend a Meeting
Learn Online
Learn About Food Science
Home ▸ Knowledge Center ▸ Core Sciences
Explore Core Sciences
Food Chemistry
Food Engineering
Food Microbiology
Sensory Science


SenseAsia 2018
The 3rd Asian Sensory and Consumer Research Symposium
13-15 May 2018 • Kuala Lumpur, Malaysia
Food Quality and Preference
Conference topics:
Reception/Sensation
• Basic processes: psychophysics and physiology
How the sensory system works
• Developments in sensory measures
• Applications of sensory methods
• Sensometrics
• Developments in measures of food choice/preference
To analyze and interpret reactions to the characteristics of food and materials as they are perceived by the senses of sight, smell, taste, touch, and hearing.
• Food choice and consumer behavior
• Sensory science and health
• Cross-cultural influences on food choice
• Sensory and consumer research into non-food products
• Sensory and culinary
✓ Conventionally results of laboratory sensory analysis and consumer acceptance tests were applied for quality control and product optimization.
6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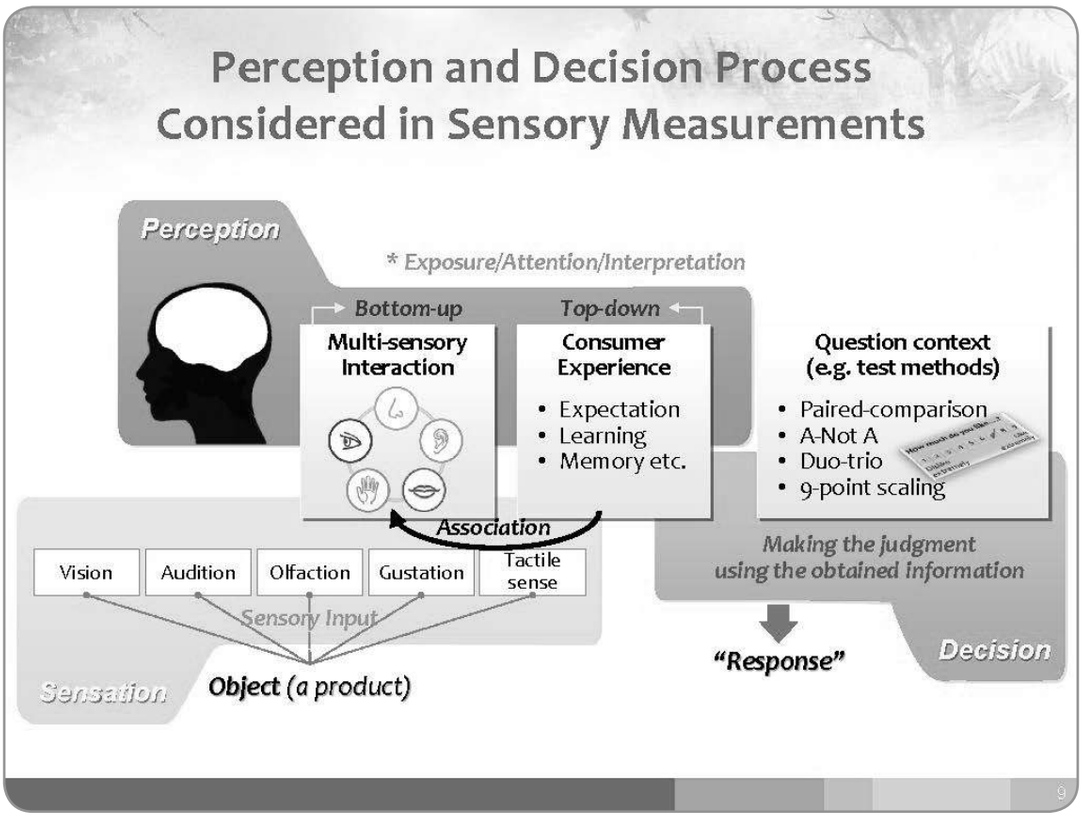
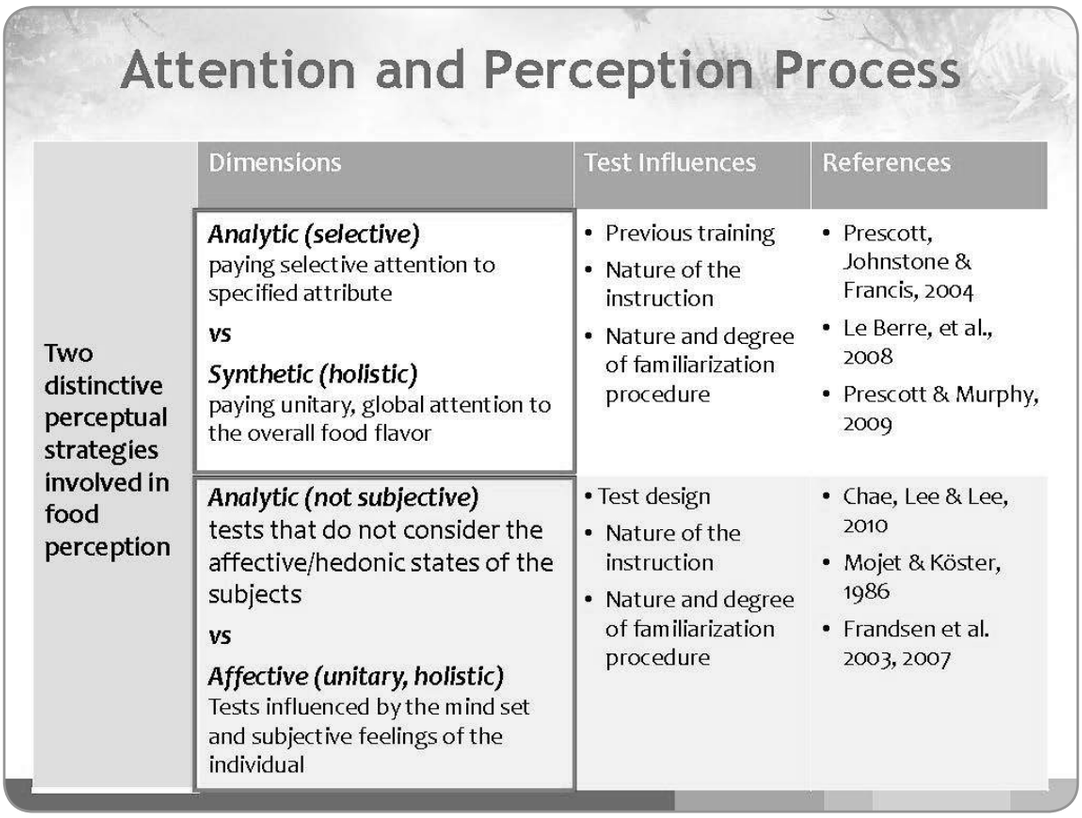
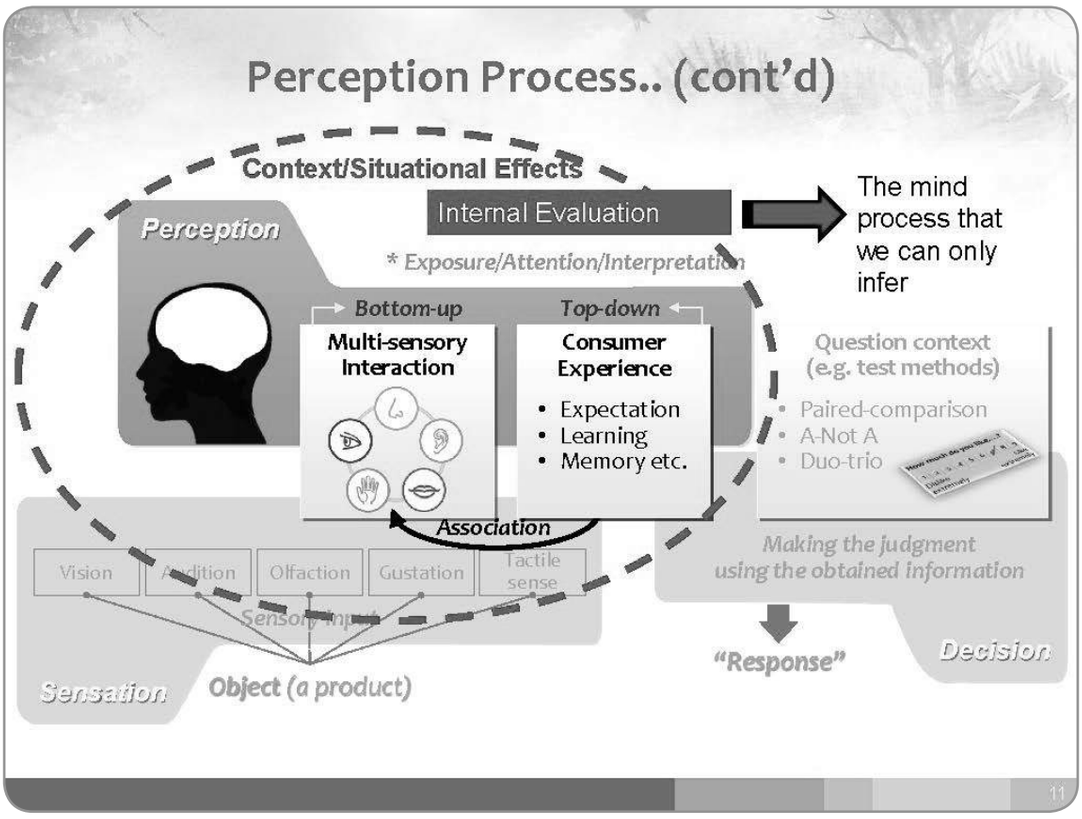
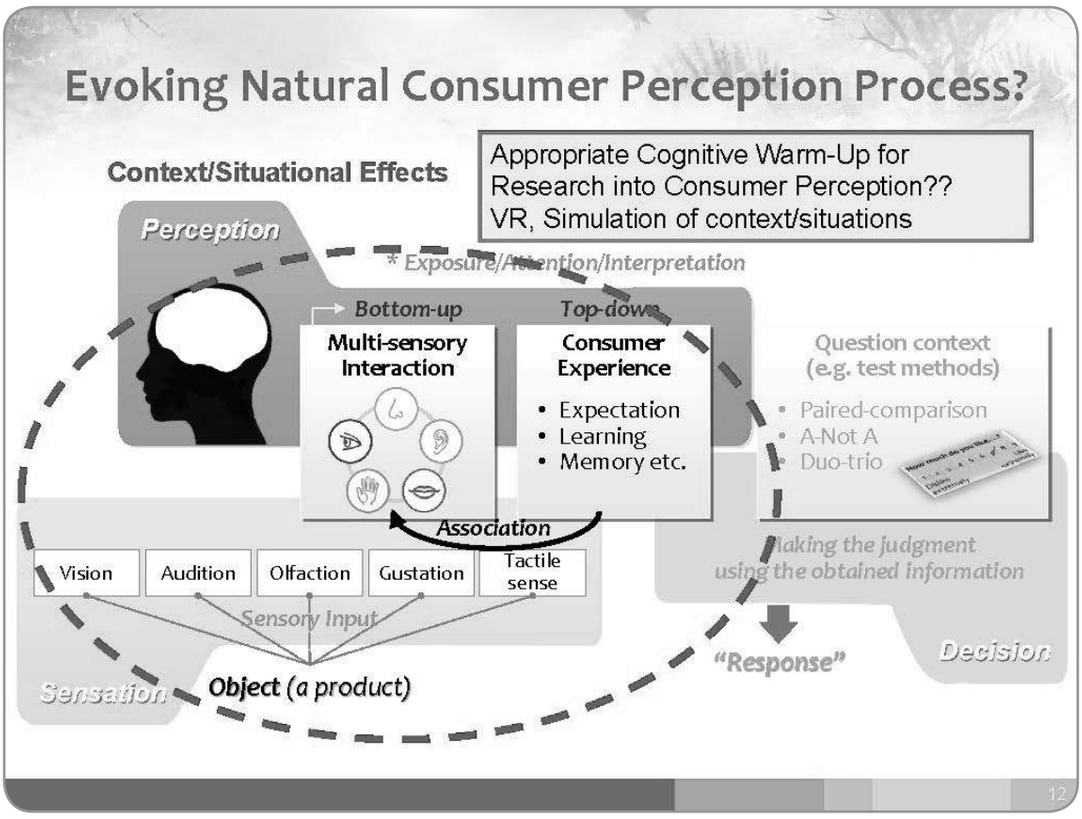
Consumer
• Food choice and consumer behavior
• Sensory science and health
• Cross-cultural influences on food choice
• Sensory and consumer research into non-food products
• Sensory and culinary
To improve satisfaction of consumers' sensory experience and promote healthy eating.
Recently focused:
✓ Strategic quality management
✓ Consumer-driven product/package design
✓ Sensory marketing
7

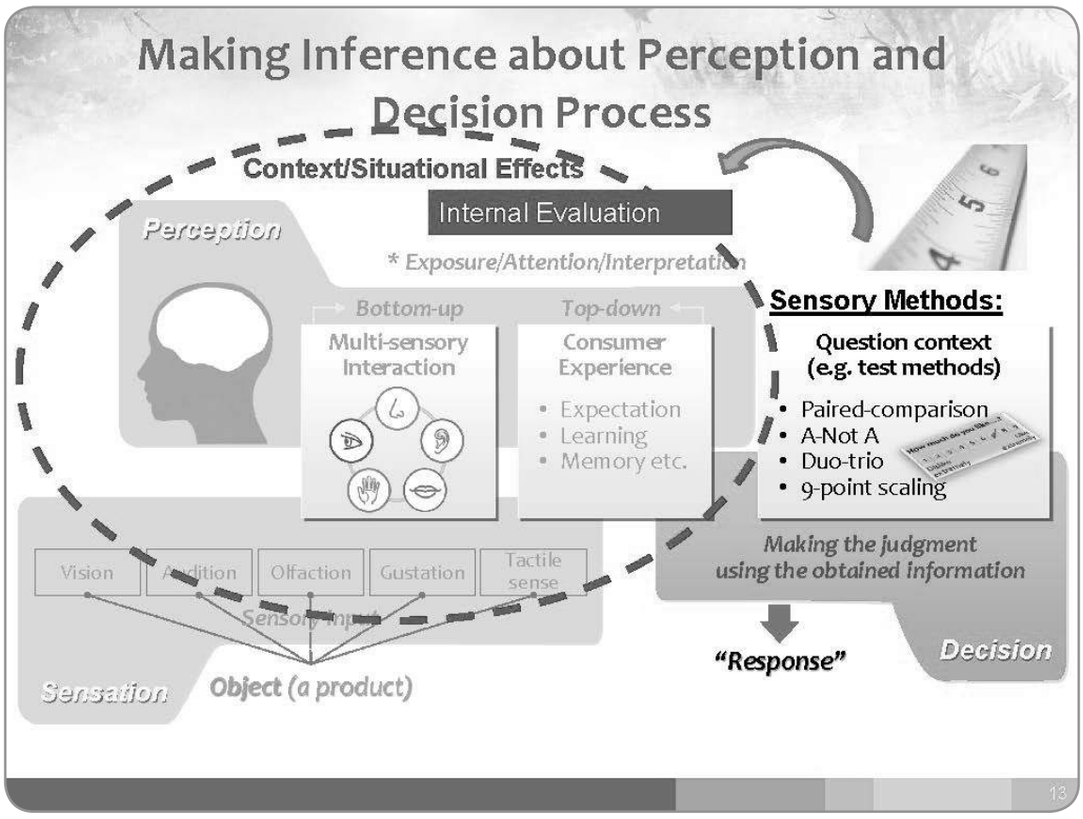

Introduction
CONSUMER PERCEPTION AND DECISION PROCESS
8

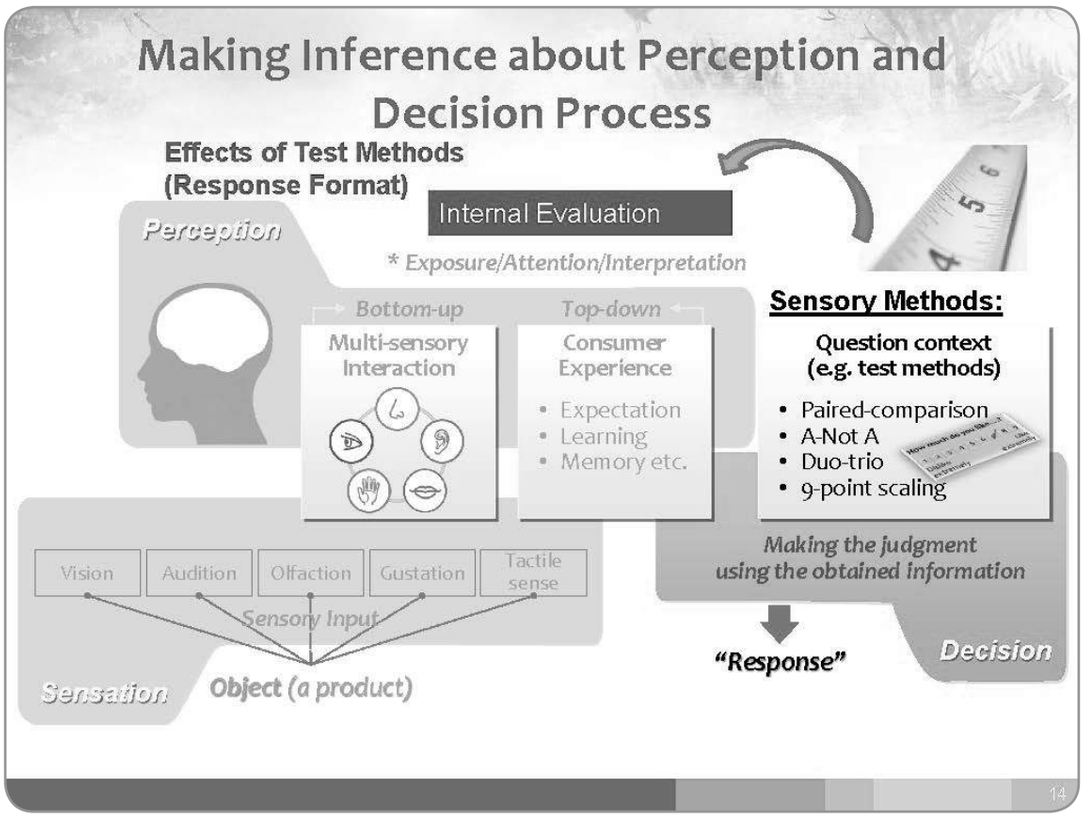

Perception and Decision Process
Considered in Sensory Measurements
Perception
* Exposure/Attention/Interpretation
Bottom-up
Top-down
Multi-sensory Interaction
Consumer Experience
• Expectation
• Learning
• Memory etc.
Question context (e.g. test methods)
• Paired-comparison
• A-Not A
• Duo-trio
• 9-point scaling
Association
Vision
Audition
Olfaction
Gustation
Tactile sense
Sensory Input
Sensation
Object (a product)
Making the judgment using the obtained information
"Response"
Decision

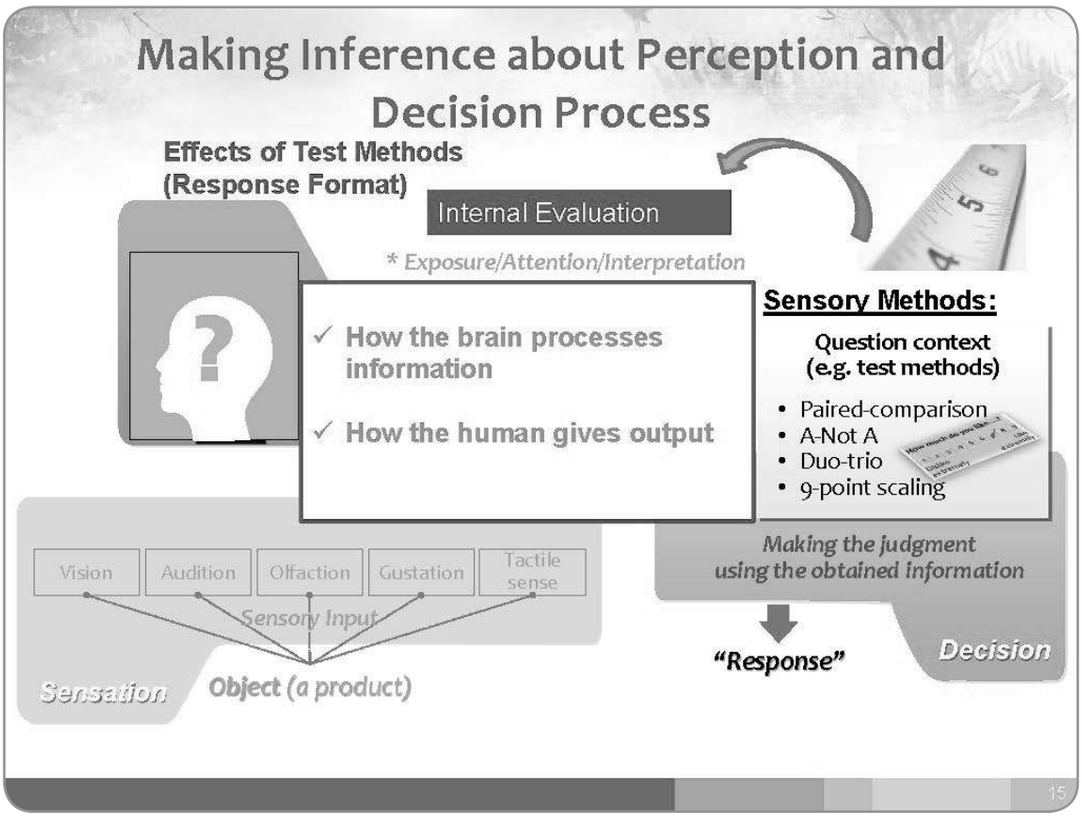

Attention and Perception Process
Two distinctive perceptual strategies involved in food perception
Dimensions
Test Influences
References
Analytic (selective)
paying selective attention to specified attribute
vs
Synthetic (holistic)
paying unitary, global attention to the overall food flavor
• Previous training
• Nature of the instruction
• Nature and degree of familiarization procedure
• Prescott, Johnstone & Francis, 2004
• Le Berre, et al., 2008
• Prescott & Murphy, 2009
Analytic (not subjective)
tests that do not consider the affective/hedonic states of the subjects
vs
Affective (unitary, holistic)
Tests influenced by the mind set and subjective feelings of the individual
• Test design
• Nature of the instruction
• Nature and degree of familiarization procedure
• Chae, Lee & Lee, 2010
• Mojet & Köster, 1986
• Frandsen et al. 2003, 2007


Perception Process.. (cont'd)
Context/Situational Effects
Perception
Internal Evaluation
The mind process that we can only infer
* Exposure/Attention/Interpretation
Bottom-up
Top-down
Multi-sensory Interaction
Consumer Experience
• Expectation
• Learning
• Memory etc.
Question context (e.g. test methods)
• Paired-comparison
• A-Not A
• Duo-trio
Association
Vision
Audition
Olfaction
Gustation
Tactile sense
Sensory Input
Making the judgment using the obtained information
"Response"
Decision
Sensation
Object (a product)
11


Evoking Natural Consumer Perception Process?
Context/Situational Effects
Appropriate Cognitive Warm-Up for Research into Consumer Perception??
VR, Simulation of context/situations
Perception
* Exposure/Attention/Interpretation
Bottom-up
Top-down
Multi-sensory Interaction
Consumer Experience
• Expectation
• Learning
• Memory etc.
Question context (e.g. test methods)
• Paired-comparison
• A-Not A
• Duo-trio
Association
Vision
Audition
Olfaction
Gustation
Tactile sense
Sensory Input
Making the judgment using the obtained information
"Response"
Decision
Sensation
Object (a product)
12


Making Inference about Perception and Decision Process
Context/Situational Effects
Internal Evaluation
Perception
* Exposure/Attention/Interpretation
Bottom-up
Top-down
Multi-sensory Interaction
Consumer Experience
• Expectation
• Learning
• Memory etc.
Sensory Methods:
Question context (e.g. test methods)
• Paired-comparison
• A-Not A
• Duo-trio
• 9-point scaling
Vision
Audition
Olfaction
Gustation
Tactile sense
Sensory Input
Making the judgment using the obtained information
"Response"
Decision
Sensation
Object (a product)
13


Making Inference about Perception and Decision Process
Effects of Test Methods (Response Format)
Internal Evaluation
Perception
* Exposure/Attention/Interpretation
Bottom-up
Top-down
Multi-sensory Interaction
Consumer Experience
• Expectation
• Learning
• Memory etc.
Sensory Methods:
Question context (e.g. test methods)
• Paired-comparison
• A-Not A
• Duo-trio
• 9-point scaling
Vision
Audition
Olfaction
Gustation
Tactile sense
Sensory Input
Making the judgment using the obtained information
"Response"
Decision
Sensation
Object (a product)
14



Assumptions for Trained Panels vs. Naive Consumers

	Cognitive Process	Sensitivity	Perception	Communication
Trained panels 	· ***Analytic*** cognitive strategy: pay selective attention to each trained attributes	· More sensitive to each attributes (each taste modlaities) · Discriminate products more based on better trained attributes	· Integration expected to be limited (representing NOT natual consumer perception, BUT product information for us to understand the product)	· Tend to be more specific and technical
Naive consumers 	· ***Synthetic*** strategy: pay unitary, global attention to the overall product taste	· Less sensitive to each attributes · Discriminate products more based on overall perception	· Much more dumping and integration/ multimodal interaction expected · Could be more sensitive to overall integrated synthetic food flavor (sensitive to Perceptual modality)	· Abstract consumer language · Non-verbal: Implicit, unconscious

Developments in Measures of Food Choice/Preference

Sensory Tests

Choice

Physiological measures

Interview

Eye tracking

Questionaire

Behavioral observations

Implicit 측정방법

Explicit 측정방법

17

Part I: Strategic Corporate Sensory Quality Management

Strategic Corporate Sensory Quality Management

- Recently sensory quality management is becoming more critical for various business objectives
  - **Reformulation including reduction of salt, fat, & sugar,** to provide healthier product
  - **Process change** to have sustainable production
  - **Cost reduction**
  - **Benchmarking**
  - **Product development/enhancement etc.**
- **The goals are keeping the equivalence in quality and/or keeping the superior quality according to consumers' perception!**
- **Consumer test methods need to be developed, which are different from the traditional analytical sensory tests using trained sensory panel**

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Part I: Strategic Corporate Sensory Quality Management

APPLICATIONS OF SENSORY DIFFERENCE & PREFERENCE TESTS

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Sensory Difference Tests: General classification

Test protocol	Sample presentation & Instruction
A-Not A	Is this 'A' or not ?
2-AFC	Which one is 'A' ?
3-AFC	Which one is 'A' ?
Constant Ref. Duo-trio	Which one is the reference?
Balanced Ref. Duo-trio	Which one is the reference?
Triangle	Which one is odd one?
Tetrad	Divide them into two groups of two
Same-different	Is this pair same or different?

Attribute or specified difference test

Overall or unspecified difference test

(e.g. Lawless & Heymann, 2010; Meilgaard, Civille, & Carr, 2015)

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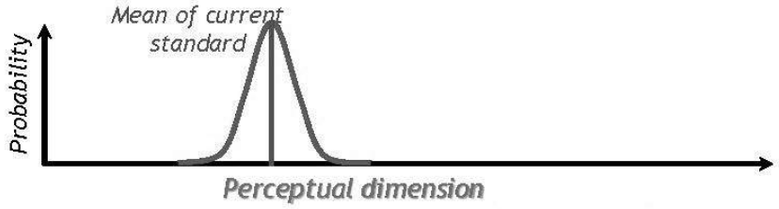
Sensory Difference Tests for Company-driven Quality Control

Traditional view of difference testing

(Lawless & Heymann, 2010; Meilgaard, Civille, & Carr, 2015; Moskowitz, Beckly, & Resurreccion, 2012)

- A set of analytical tools for product testing: **'significant difference'** based on binomial tests
- Trained sensory panels or sensory specialists: **equally sensitive human instruments**
- Conformity in quality: **controlling dispersion from its own production mean**



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Sensory Difference Tests for Consumer-oriented Quality Management Program?

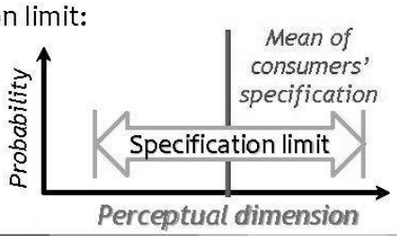
Recent advances in signal detection theory (SDT) & Thurstonian modeling context

(Ennis, Rousseau, & Ennis, 2014; Ishii, O'Mahony, & Rousseau, 2014; Jesionka, Rousseau, & Ennis, 2014; van Hout, 2014; Rousseau, 2015; Kim & Lee, 2015)

- A set of analytical measurement instruments: **degree of difference between products based on *d'* estimates**
  - Theorized test power & precision considering cognitive decision strategy

- Determination of consumers' specification limit: **to be set as a business 'action standard'**
  - 'consumer relevance'
  - 'meaningful difference'

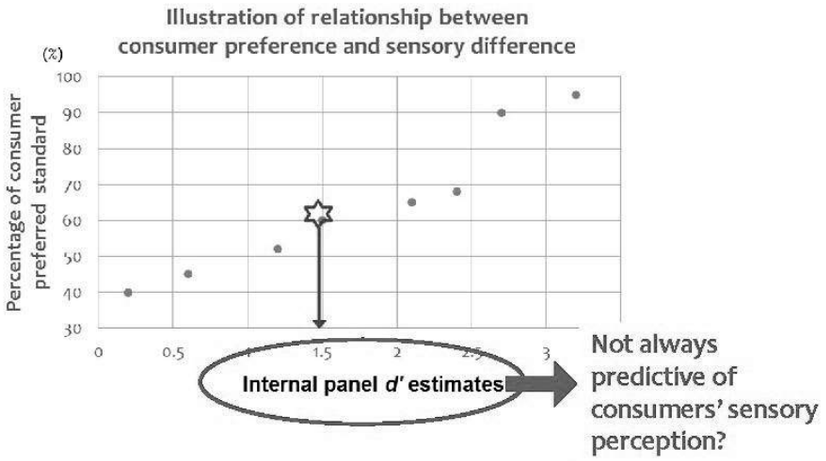
  (Ennis et al., 2014; Ishii et al., 2014; van Hout, 2014; Kim, Sim & Lee, 2015; Rousseau, 2015)



23

Sensory Difference Tests: How can we measure or determine the consumers' specification limits?

An exemplary approach for determination of consumers' specification limit for reformulation (e.g. Rousseau, 2015)



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Sensory Difference Tests: How can we measure or determine the consumers' specification limits?

Further consideration for strategic quality Management

Consumer evidence of sensory discrimination needed?

- √ Reformulation may involve many different directions of changes
- √ Loyal consumers may be more sensitive than sensory panels.
- √ More intense branding effects increase consumers sensitivity.
- √ Globalization and need for predicting foreign consumers
- √ Even when a group of consumers shows no preference, it is useful to find out consumers can discriminate.

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Sensory Difference Tests for Measuring Consumer Discrimination

Test protocol	Sample presentation & Instruction
A-Not A	Is this 'A' or not ?
2-AFC	Which one is 'A' ?
3-AFC	Which one is 'A' ?
Constant Ref. Duo-trio	Which one is the reference?
Balanced Ref. Duo-trio	Which one is the reference?
Triangle	Which one is odd one?
Tetrad	Divide them into two groups of two
Same-different	Is this pair same or different?

Difference tests using consumers/ naïve subjects

→ Overall or unspecified difference test

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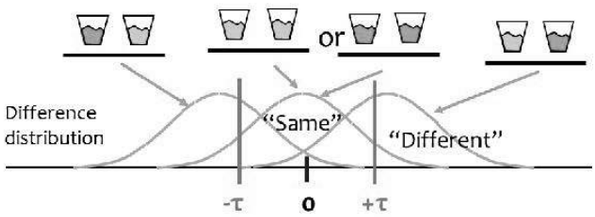
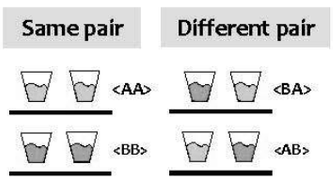
Sensory Difference Tests for Measuring Consumer Discrimination

Same-different | Is this pair same or different?

(e.g. O'Mahony & Rousseau, 2002; Lee et al., 2007; Chae et al., 2010; Rousseau, 2015)

- **Consumers' specified limit (sensory-based) e.g. τ-criterion** on group average can indicate how different it has to be, before it is reported to be 'different'





Four sample presentation sequences are used in a balanced design

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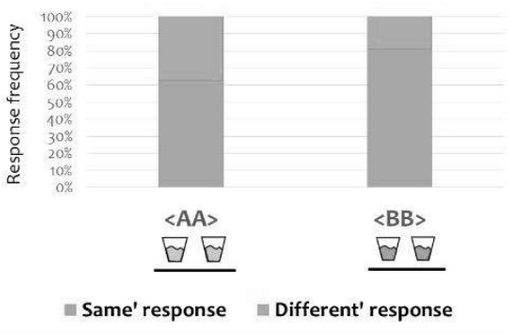
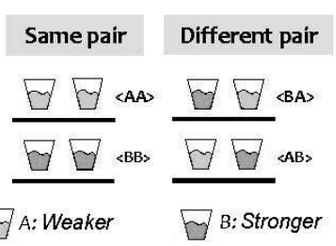
Sensory Difference Tests for Measuring Consumer Discrimination

Further consideration for strategic quality Management

Consumers' differential familiarity & affects lead to different response probability to 'same' pair of products

(Chae, Lee, & Lee, 2010)





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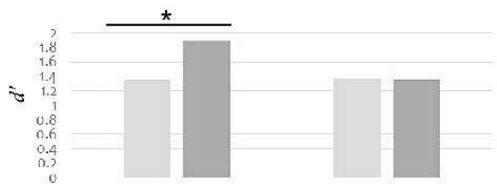
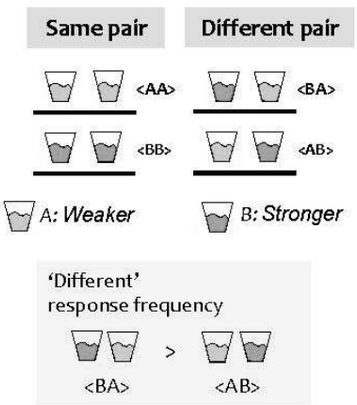
Sensory Difference Tests for Measuring Consumer Discrimination

Further consideration for strategic quality Management

Sensory distance estimation between different pair of products affected by sample presentation sequence

(Choi, van Hout, Christensen, & Lee, 2014)





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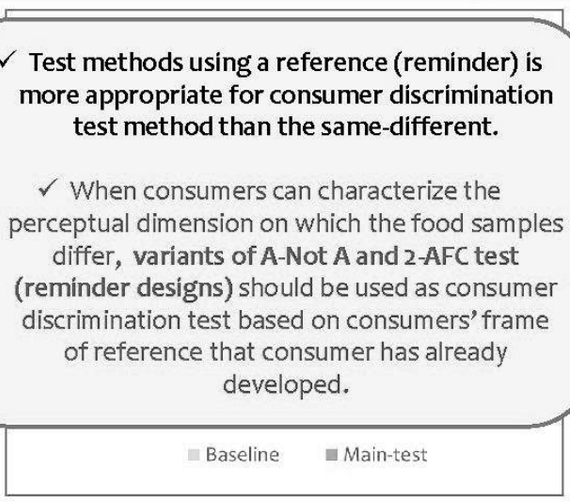
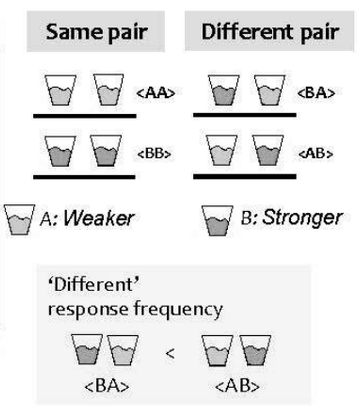
Sensory Difference Tests for Measuring Consumer Discrimination

Further consideration for strategic quality Management

✓ Test methods using a reference (reminder) is more appropriate for consumer discrimination test method than the same-different.

✓ When consumers can characterize the perceptual dimension on which the food samples differ, **variants of A-Not A and 2-AFC test (reminder designs)** should be used as consumer discrimination test based on consumers' frame of reference that consumer has already developed.





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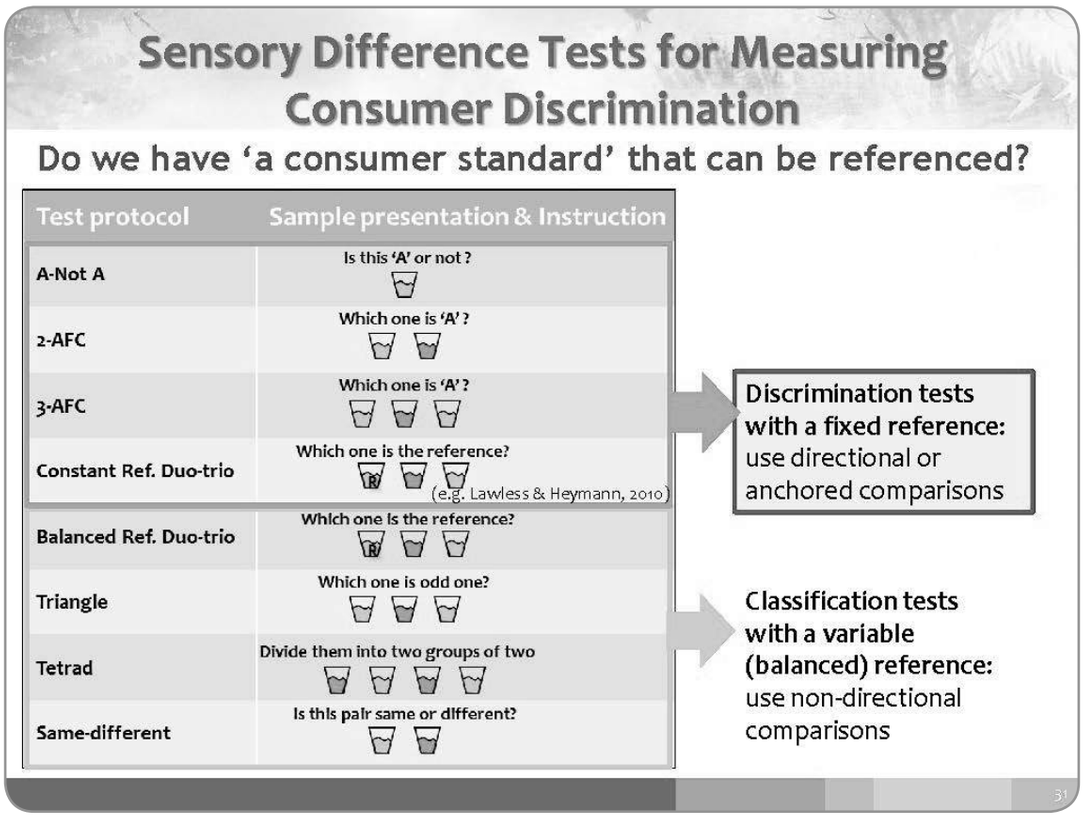
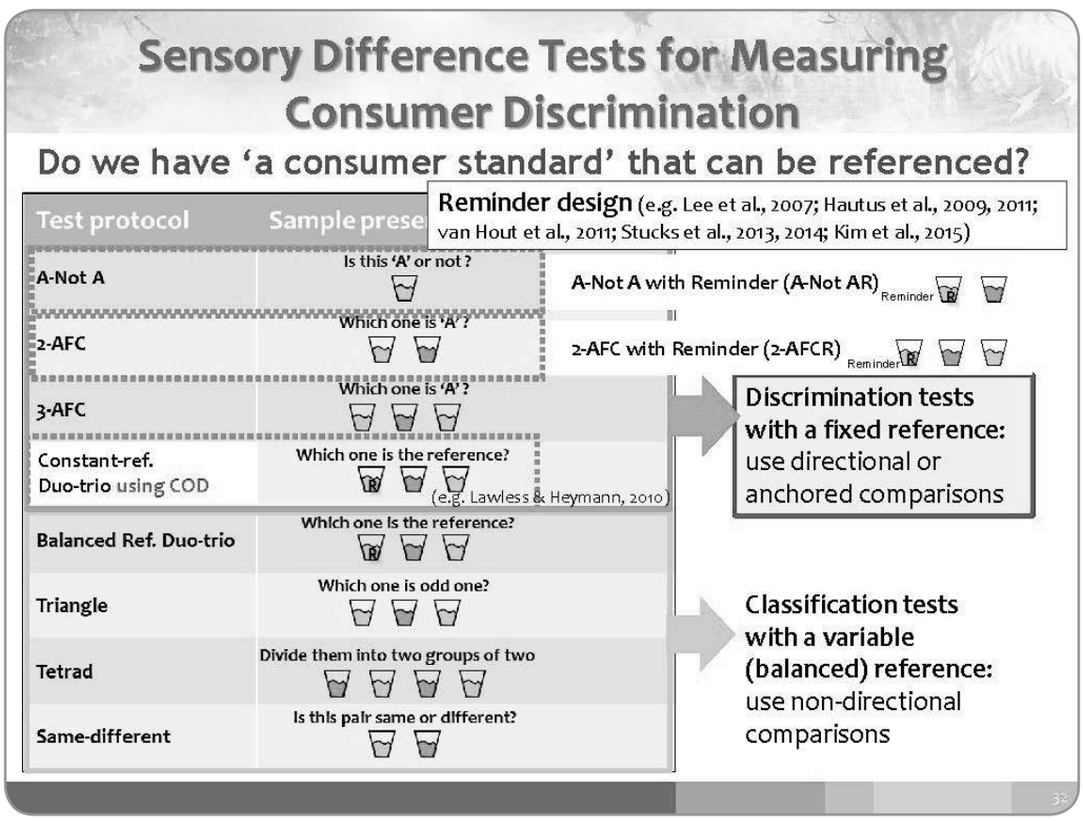
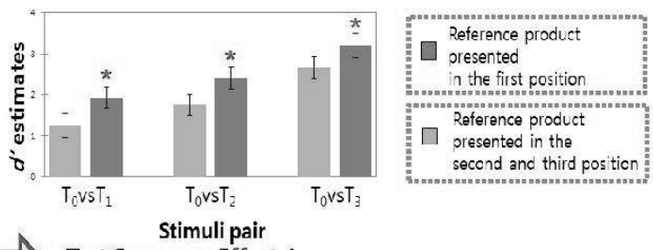

Sensory Difference Tests for Measuring Consumer Discrimination
Do we have 'a consumer standard' that can be referenced?
Test protocol
Sample presentation & Instruction
A-Not A
Is this 'A' or not ?
2-AFC
Which one is 'A' ?
3-AFC
Which one is 'A' ?
Constant Ref. Duo-trio
Which one is the reference?
(e.g. Lawless & Heymann, 2010)
Balanced Ref. Duo-trio
Which one is the reference?
Triangle
Which one is odd one?
Tetrad
Divide them into two groups of two
Same-different
Is this pair same or different?
Discrimination tests with a fixed reference: use directional or anchored comparisons
Classification tests with a variable (balanced) reference: use non-directional comparisons
31


Sensory Difference Tests for Measuring Consumer Discrimination
Do we have 'a consumer standard' that can be referenced?
Reminder design (e.g. Lee et al., 2007; Hautus et al., 2009, 2011; van Hout et al., 2011; Stucks et al., 2013, 2014; Kim et al., 2015)
Test protocol
A-Not A
Is this 'A' or not ?
A-Not A with Reminder (A-Not AR)
Reminder
2-AFC
Which one is 'A' ?
2-AFC with Reminder (2-AFCR)
Reminder
3-AFC
Which one is 'A' ?
Constant-ref. Duo-trio using COD
Which one is the reference?
(e.g. Lawless & Heymann, 2010)
Balanced Ref. Duo-trio
Which one is the reference?
Triangle
Which one is odd one?
Tetrad
Divide them into two groups of two
Same-different
Is this pair same or different?
Discrimination tests with a fixed reference: use directional or anchored comparisons
Classification tests with a variable (balanced) reference: use non-directional comparisons
32

Affective discrimination method using reference framing vs variable-reference classification methods (Jeong, et al., 2016)

d′ of triangle vs reminder designs (A-Not AR, duo-trio) vs tetrad methods

Stimuli Pair	Triangle test sequence				T_0 : Fixed reference (highest market share)	
	T_o-T_n-T_n	T_n-T_o-T_n	T_n-T_n-T_o	T_n-T_o-T_o	T_o-T_n-T_o	T_o-T_o-T_n
$T_o$vsT_1	1.42^{bc}(0.24)	**1.60^{ab} (0.23)**	**0.61^{c} (0.42)**	**1.33^{bc}(0.25)**	2.15^{a} (0.23)	2.23^{a} (0.23)
$T_o$vsT_2	2.37^{ab}(0.24)	**1.98^{bc} (0.23)**	**1.64^{c} (0.23)**	**1.64^{c} (0.23)**	2.15^{abc}(0.23)	2.70^{a} (0.24)
$T_o$vsT_3	2.90^{bc}(0.25)	**3.25^{ab}(0.27)**	**2.19^{c} (0.23)**	**2.60^{bc} (0.24)**	2.90^{bc}(0.25)	3.93^{a} (0.32)



Test Sequence Effects!

The tests having the reference presented in the first position, performed better than the tests having other sample sequences.

Affective discrimination method using reference framing vs variable-reference classification methods (Jeong, et al., 2016)

d′ of triangle vs reminder designs (A-Not AR, duo-trio) vs tetrad methods

Stimuli Pair	Triangle test sequence				T_0 : Fixed reference (highest market share)	
	T_o-T_n-T_n	T_n-T_o-T_n	T_n-T_n-T_o	T_n-T_o-T_o	T_o-T_n-T_o	T_o-T_o-T_n
$T_o$vsT_1	1.42^{bc}(0.24)	1.60^{ab} (0.23)	0.61^{c} (0.42)	1.33^{bc}(0.25)	2.15^{a} (0.23)	2.23^{a} (0.23)
$T_o$vsT_2	2.37^{ab}(0.24)	1.98^{bc} (0.23)	1.64^{c} (0.23)	1.64^{c} (0.23)	2.15^{abc}(0.23)	2.70^{a} (0.24)
$T_o$vsT_3	2.90^{bc}(0.25)	3.25^{ab}(0.27)	2.19^{c} (0.23)	2.60^{bc} (0.24)	2.90^{bc}(0.25)	3.93^{a} (0.32)

× 1.2 times

Total Pooled (over 6 test sequences)	2.17 (0.11)	2.61 (0.10)

Comparable

Subjects	Stimuli pair	A-Not AR Using τ-strategy	Constant Ref. Duo-trio using COD	Tetrad
Pooled	TovsT1+2+3	2.91(0.18)	2.75(0.21)	1.93(0.10)

Triangle & Constant Ref. DTF/2-AFCR having **same test sequences** resulted in **similar d' values**!

1) The triangle method having six different test sequences is operationally inferior.
2) Duo-trio could be considered as employing the optimal sequences from the triangle test.
3) Sequence effects also found for tetrad (as much operational problems as the triangle).

Consumers' quality evaluation & affects are ideographic.

Affective discrimination method using reference framing

➢ Investigation of effects of involving consumers' affective state of mind
(Kim, Chae, van Hout & Lee, 2014)

Condition 1	**Traditional triangle method**
Condition 2	**Duo-trio in a normal analytical way** using a fixed-saltier reference
Condition 3	**Duo-trio with an artificial brand image provided**
Condition 4	**Duo-trio providing the preferred one as reference**

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➢ Investigation of effects of involving consumers' affective state of mind
(Kim, Chae, van Hout & Lee, 2014)

Comparison of test performances using triangle method as a control

Pre-test: Triangle method (Total 6 sets)
Consumers (n=258) were equally divided into 4 groups according to their sensitivity.

	Group 1 (N=66) Triangle	Group 2 (N=64) Triangle	Group 3 (N=64) Triangle	Group 4 (N=64) Triangle	Total (N=258)
Replication	6	6	6	6	6
Pc	0.54	0.54	0.54	0.54	0.54
Pd (SE)	0.31 (0.04)	0.31 (0.04)	0.30 (0.04)	0.31 (0.04)	0.31 (0.02)
d' (SE)	1.66 (0.13)[a]	1.67 (0.13)[a]	1.65 (0.13)[b]	1.68 (0.13)[b]	1.67 (0.06)

Main-test: Comparison of test performance among different test methods

	Condition 1 Triangle	Condition 2 Duo-trio	Condition 3 Duo-trio w/ brand	Condition 4 Duo-trio w/ preferred R
Replication	8	6	6	5
Pc	0.53	0.74	0.81	0.82
Pd (SE)	0.29 (0.04)	0.49 (0.06)	0.62 (0.04)	0.63 (0.05)
d' (SE)	1.61 (0.12)[a]	2.00 (0.19)[a]	2.43 (0.16)[a]	2.48 (0.20)[a]

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➢ Investigation of effects of involving consumers' affective state of mind
(Kim, Chae, van Hout & Lee, 2014)

Comparison of test performances using identical sequences

Pre-test

	Group 2 (N=64) Triangle	Group 3 (N=64) Triangle	Group 4: pref. A (N=38) Triangle	Group 4: pref. B (N=26) Triangle	All Group (N=258) Triangle
Stimuli presentation	<A-A-B>, <A-B-A>	<A-A-B>, <A-B-A>	<A-A-B>, <A-B-A>	<B-A-B>, <B-B-A>	All sequences
d' (*SE*)	2.14 (0.22)	1.83 (0.22)	2.21 (0.29)	2.05 (0.40)	1.67 (0.06)

Main-test

	Condition 2 Duo-trio	Condition 3 Duo-trio w/ brand	Condition 4 Duo-trio w/ preferred R	Condition 4 Duo-trio w/ preferred R
Stimuli presentation	<A: A B>, <A: B A>	<A: A B>, <A: B A>	<A: A B>, <A: B A>	<B: A B>, <B: B A>
d' (*SE*)	2.00 (0.19)	2.43 (0.16)	2.48 (0.27)	2.47 (0.29)

The results suggest that in condition 3, the higher attention might be the reason for improving the discrimination, while in condition 4, the sample presentation sequence itself was favorable or optimized.

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Sensory Difference Tests for Measuring Consumer Discrimination

Do we have 'a consumer standard' that can be referenced?

Test protocol	Sample prese
A-Not A	Is this 'A' or not ?

Reminder design (e.g. Lee et al., 2007; Hautus et al., 2009, 2011; van Hout et al., 2011; Stucks et al., 2013, 2014; Kim et al., 2015)

Consumers' overall satisfaction and perception of sensory driven conceptual attributes – authenticity, naturalness, freshness etc.
might be better studied by using such consumer discrimination test methods **(reminder design)**

✓ When more familiar, or preferred sample is known, **applying a fixed reference discrimination design (reminder design)** rather than a variable (balanced) reference design might be more suitable.

✓ **Action standard: An empirical threshold of a target group of consumers**

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Part I: Strategic Corporate Sensory Quality Management

APPLICATIONS OF SENSORY ACCEPTANCE & CONCEPT TESTS

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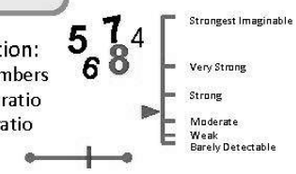
Consumer Acceptance & Concept Measurement

The measurement instrument

Direct Scaling

- Numerical estimation:
  - Giving interval numbers
  - Giving magnitude ratio
  - Giving positional ratio

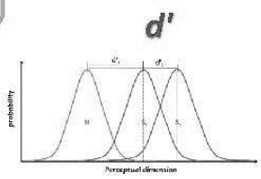
etc.



- Commonly applied in consumer research
- Difficult for measuring small differences
- Providing NOT absolute sensitivity BUT bias measure – numbers are affected by consumers preference for a response option

Indirect Scaling

- **Signal Detection Theory (SDT)**
- **Thurstonian scaling**



- Broadly accepted in difference tests
- Suitable for measuring low strength of stimulations
- Providing BOTH sensitivity (d') and bias measures
- **Proper instrument for measurement of consumer acceptance/satisfaction change & concept perception !**

3

Development of Ecologically Valid Consumer Acceptance Measurement

Food Quality and Preference 63 (2018) 28–37

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Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Degree of satisfaction-difference (DOSD) method for measuring consumer acceptance: A signal detection measurement with higher reliability than hedonic scaling

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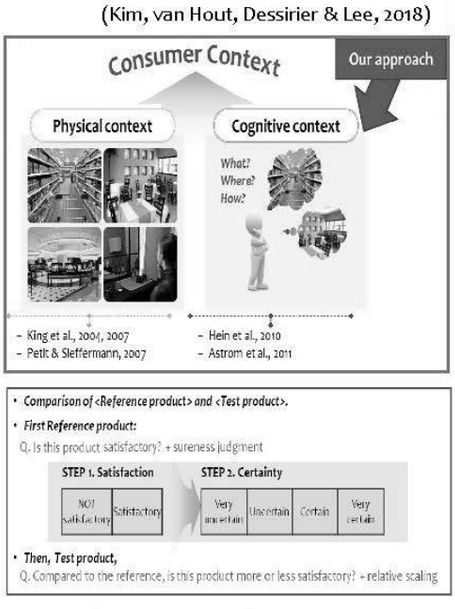
Development of Ecologically Valid Consumer Acceptance Measurement

Method development to improve ecological validity & robustness of consumer hedonic tests:

1. COGNITIVE WARM-UP (CWU)
Before the test starts, consumers get a series of questions on their experience and opinion of the product type. This helps to remind them of their frame of reference, similar to when they would consider choosing a product to use

2. INDIRECT SCALING METHOD (DOSD test)
A task where consumers evaluate products within their natural frame of reference, by comparing it with a reference product

(Kim, van Hout, Dessirier & Lee, 2018)



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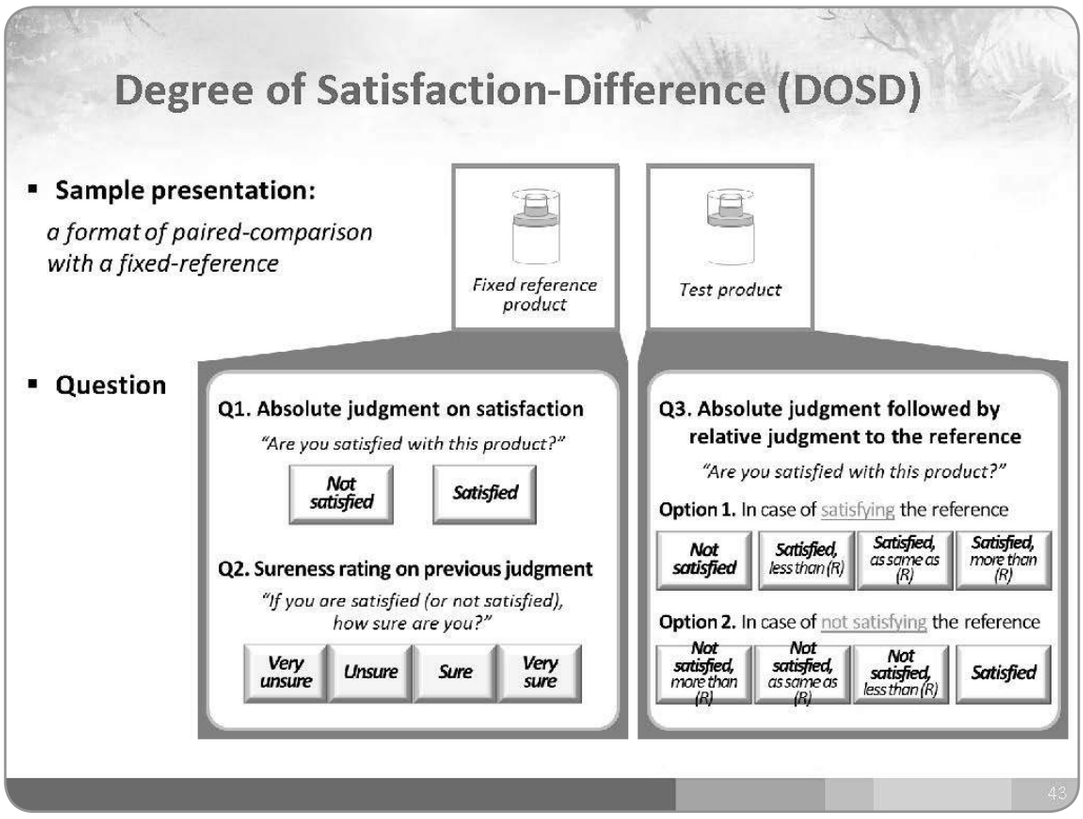
Degree of Satisfaction-Difference (DOSD)
Sample presentation:
a format of paired-comparison with a fixed-reference
Fixed reference product
Test product
Question
Q1. Absolute judgment on satisfaction
"Are you satisfied with this product?"
Not satisfied
Satisfied
Q2. Sureness rating on previous judgment
"If you are satisfied (or not satisfied), how sure are you?"
Very unsure
Unsure
Sure
Very sure
Q3. Absolute judgment followed by relative judgment to the reference
"Are you satisfied with this product?"
Option 1. In case of satisfying the reference
Not satisfied
Satisfied, less than (R)
Satisfied, as same as (R)
Satisfied, more than (R)
Option 2. In case of not satisfying the reference
Not satisfied, more than (R)
Not satisfied, as same as (R)
Not satisfied, less than (R)
Satisfied
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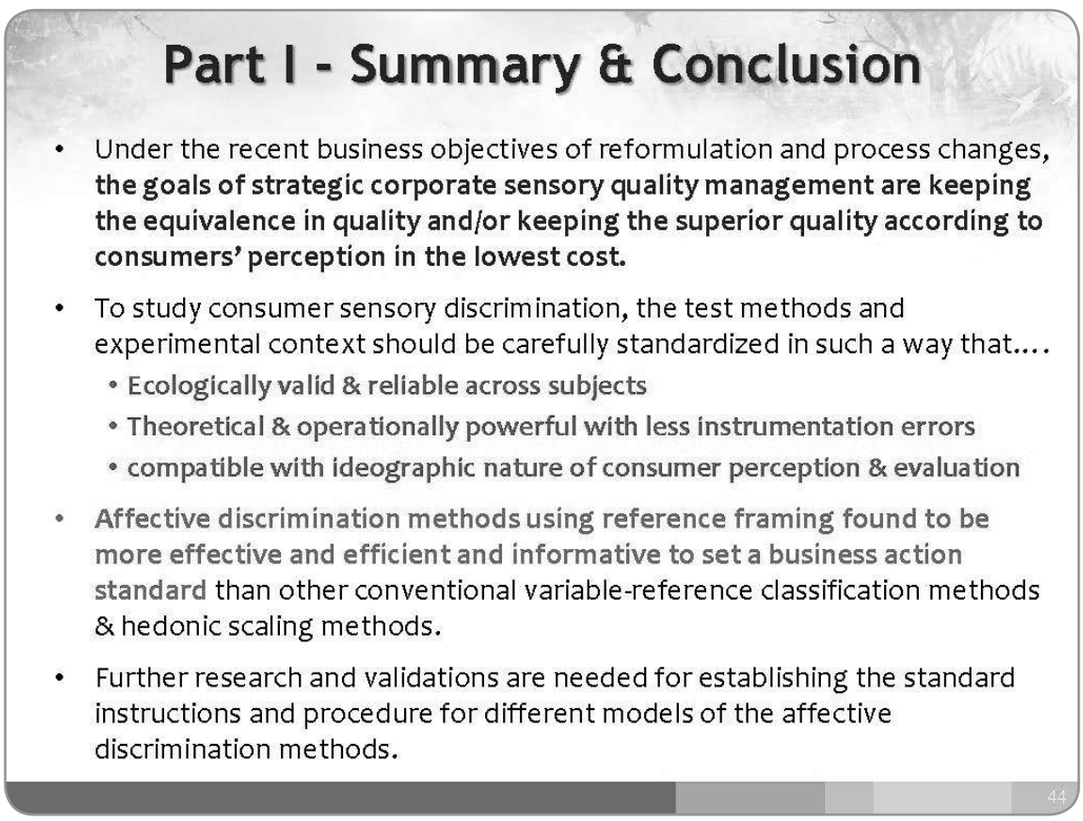
Part I - Summary & Conclusion
• Under the recent business objectives of reformulation and process changes, the goals of strategic corporate sensory quality management are keeping the equivalence in quality and/or keeping the superior quality according to consumers' perception in the lowest cost.
• To study consumer sensory discrimination, the test methods and experimental context should be carefully standardized in such a way that....
• Ecologically valid & reliable across subjects
• Theoretical & operationally powerful with less instrumentation errors
• compatible with ideographic nature of consumer perception & evaluation
• Affective discrimination methods using reference framing found to be more effective and efficient and informative to set a business action standard than other conventional variable-reference classification methods & hedonic scaling methods.
• Further research and validations are needed for establishing the standard instructions and procedure for different models of the affective discrimination methods.
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Part II: Consumer-driven Product/Package Design & Sensory Marketing

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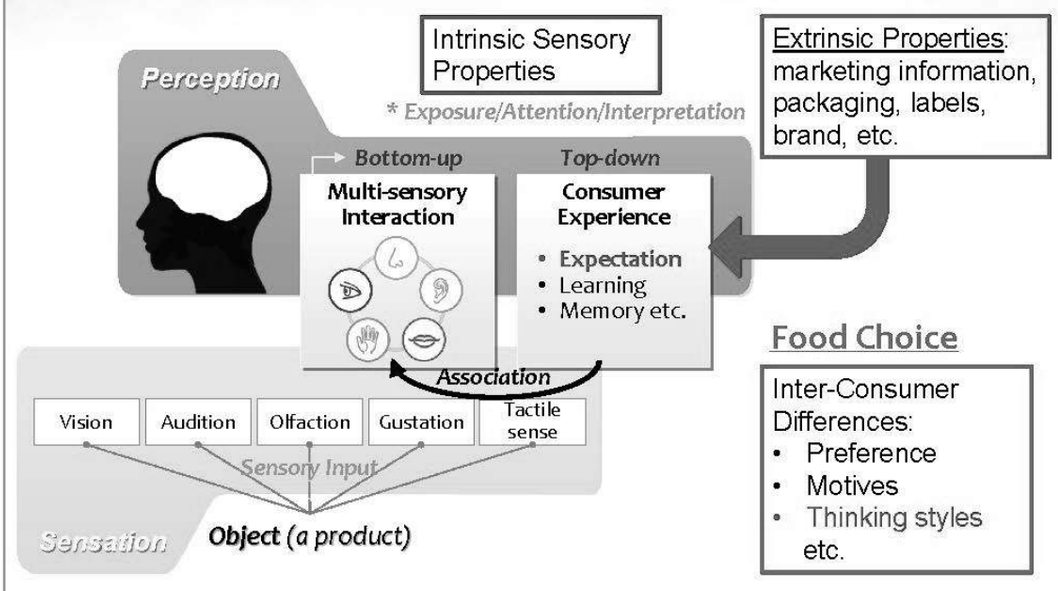
Consumers' Natural Sensory Perception, Evaluation & Food Choice



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Part II: Consumer-driven Product/Package Design & Sensory Marketing

APPLICATIONS OF CONSUMER PERCEPTUAL EXPERIENCE MEASUREMENT

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Measurement of Consumer Holistic Product Usage Experience Using Signal Detection Theory

Journal of Sensory Studies
Journal of Sensory Studies ISSN 0887-8250

DEVELOPMENT OF A CONSUMER-RELEVANT LEXICON FOR TESTING KITCHEN CLEANSERS CONSIDERING DIFFERENT PRODUCT USAGE STAGES

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Food Quality and Preference 56 (2017) 189–200

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

A novel two-step rating-based 'double-faced applicability' test. Part 1: Its performance in sample discrimination in comparison to simple one-step applicability rating

In-Ah Kim[a], Andrew Hopkinson[b], Danielle van Hout[c], Hye-Seong Lee[a,*]

Food Quality and Preference 59 (2017) 141–149

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

l two-step rating-based 'double-faced applicability' test. Part 2: cing a novel measure of affect magnitude (d'_A) for profiling ...ers' product usage experience based on Signal Detection Theory

In-Ah Kim[a], Andrew Hopkinson[b], Danielle van Hout[c], Hye-Seong Lee[a,*]

[a]Department of Food Science and Technology, College of Engineering, Ewha Womans University, Seoul 03760, South Korea
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Measurement of Consumer's Product Usage Experience

- Measuring consumer's perceptual product usage experience is central for various business objectives including product development and marketing.
- Consumer's product usage experience consists of many different usage stages and relative importance of product attributes could depend on the usage stages.

- Thus, it is necessary to develop a consumer test methodology that can quantitatively measure consumer-relevant product attributes specific to usage stages.

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Measurement of Consumer's Product Usage Experience

- 1st Step: Development of a lexicon of consumer-relevant product attributes specific to product usage stages

Pre-study

Development of Sematic/Language Library

① Collecting all marketing commination's & product descriptors
② Identifications of benefit-relevant semantic categories
③ Classifications of attributes according to semantic categories
④ Rearrangement of sematic/language library using positive/negative attributes

Experimental Procedures of the Main Test

① Ethnographic Observation
- Cognitive & physical warm-up

② Ethnographic Interview
- Cognitive warm-up

③ Introduction of Semantic Library
- Reminders for consumer concepts by looking through the semantic/language library

④ Cued-interview
- Using series of completion tasks with structured response options from semantic/language library

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Measurement of Consumer's Product Usage Experience

- 2nd Step: Development of '**double-faced applicability**' test method & output measure, affect magnitude (d'_A)

A pair of semantic-differential descriptors

Feeling relieved ↔ Feeling frustrated

Representing two-sides of each consumer-relevant product attribute

1st step: applicability scores **2nd step: 3-point sureness rating**

Yes	No
√	

Not sure	1	2	3	Very sure
			√	

Providing multiple criteria for subjects' judgments on applicability of each attribute

- **Example of questionnaire**

From the following list of descriptors, please answer "Yes (does apply)" or "No (does not apply)" to each descriptor according to whether or not you experienced (or perceived) it.
And immediately, please rate the degree of sureness with 1 to 3 to your previous response.

Convenience	Yes	No	Not sure 1	2	Very sure 3
Simple to use					
Convenient to use					

Sentimental Consequence	Yes	No	Not sure 1	2	Very sure 3
Feeling relieved					
Feeling not refreshed and Uncomfortable					

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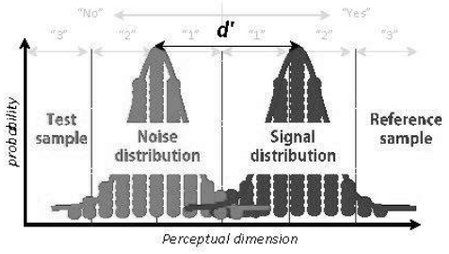
Conventional *d'* *vs.* novel d'_A analyses

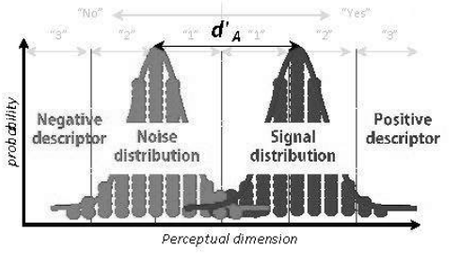
Comparing the test sensitivity and efficiency in product discrimination



Conventional *d'* analysis

- It assumes the responses to **test sample as noise** distribution and the responses to **reference sample as signal** distribution.
- It can quantify the **degree of difference in applicability between two samples**.
- Physical reference sample is <u>essential.</u>
- Individual product profiling is <u>not possible</u>.

Generating affective usage experience profile for each sample



Novel d'_A analysis

- It assumes the responses to **negative descriptor as noise** distribution and the responses to **positive descriptor as signal** distribution.
- It can quantify the **affect magnitude for each consumer-relevant attribute for each sample**.
- Physical reference sample is <u>not essential.</u>
- Individual product profiling is <u>possible</u>.

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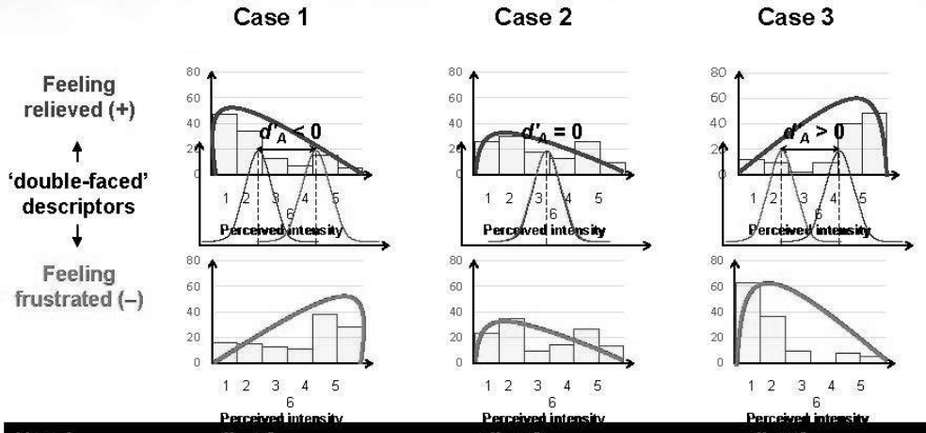
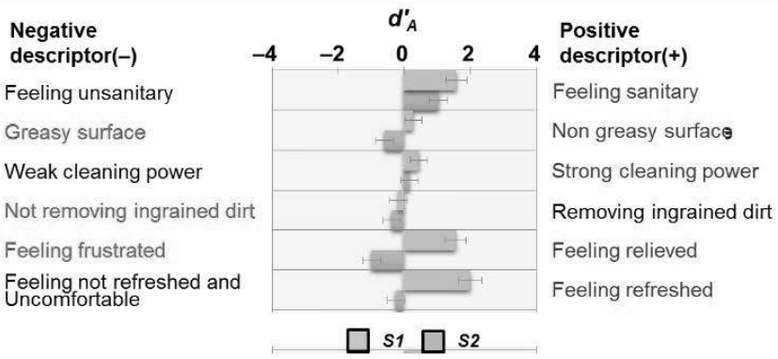
Three cases of affect magnitude (d'_A)



Novel quantitative	$d'_A < 0$ Significantly higher than	$d'_A = 0$ Equals to '0'	$d'_A > 0$ Significantly lower than
Affect magnitude	Negative affect	Neutral (or ambivalence)	Positive affect
Applicability diagnosis	Negative descriptor is more applicable	Non-applicability ambivalence	Positive descriptor is more applicable

Characterization and Applicability Diagnosis for Each Sample

Novel quantitative output measure	$d'_A < 0$ Significantly higher than '0'	$d'_A = 0$ Equals to '0'	$d'_A > 0$ Significantly lower than '0'
Affect magnitude	Negative affect	Neutral (or ambivalence)	Positive affect
Applicability diagnosis	Negative descriptor is more applicable than positive descriptor	Non-applicability on average or ambivalence	Positive descriptor is more applicable than negative descriptor



Part II: Consumer-driven Product/Package Design & Sensory Marketing

APPLICATIONS OF CONSUMER BEHAVIOR MEASUREMENT AND DEVELOPING COMMUNICATION STRATEGY

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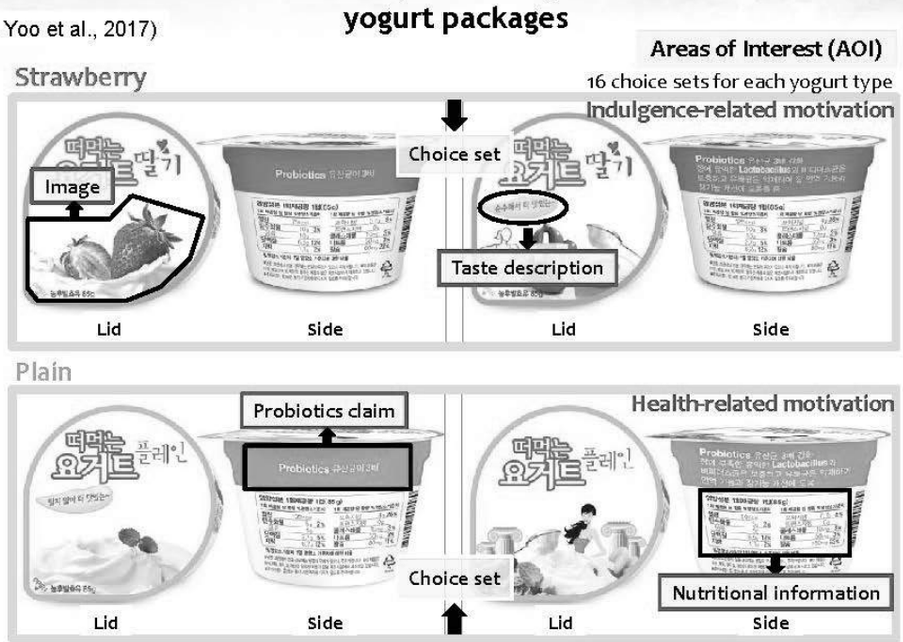
Eye-tracking Technique

- **Lead to insights into**
  - How consumers process information of food label
  - How such difference in thinking style moderates consumers' food choice (Ares et al., 2014)
- **Together with measurement of choice behavior (discrete choice experiments)**
  - Confirm whether a certain variable of product is relevant for consumers' attention (Vidal et al., 2013)

→ Package labels should be designed taking into account the inter-consumer differences in thinking styles, in order to attract consumer attention and promote heathy eating by designing easily recognizable nutritional information

The influence of thinking style on food choice is modulated by food consumption context:
Evidence from measures of eye-tracking and choice behavior with yogurt packages

(HJ. Yoo et al., 2017)



Results

148 consumers

Cognitive Reflection Test (CRT) (Frederick, 2005)

HRT (n = 49)	NT (n = 57)	LRT (n = 42)
More analytical, rational	Neither analytical nor intuitive	More intuitive

Results

Eye-tracking result

Intuitive consumers tend to need less time and attention to process food label than rational consumers.

	Strawberry			Plain		
Choice set	HRT	NT	LRT	HRT	NT	LRT
Time to mouse click (s)	9.8[b]	8.9[ab]	7.4[a]	8.5	9.0	7.8
Total fixation duration (s)	9.4[b]	8.5[ab]	7.1[a]	8.2	8.7	7.2
Fixation count	32.8[b]	28.7[ab]	24.9[a]	28.6	29.6	25.7

Only in strawberry yogurt type, CRT groups differed in how they processed choice sets.

- Time to mouse click is the time until a consumer made a mouse click within a choice set.
- Total fixation duration is the total duration of all the fixations a consumer makes within an AOI.
- Fixation count is the total number of times that a consumer fixates his/her gaze on an AOI.

Results

Choice conjoint result with variables' effect size

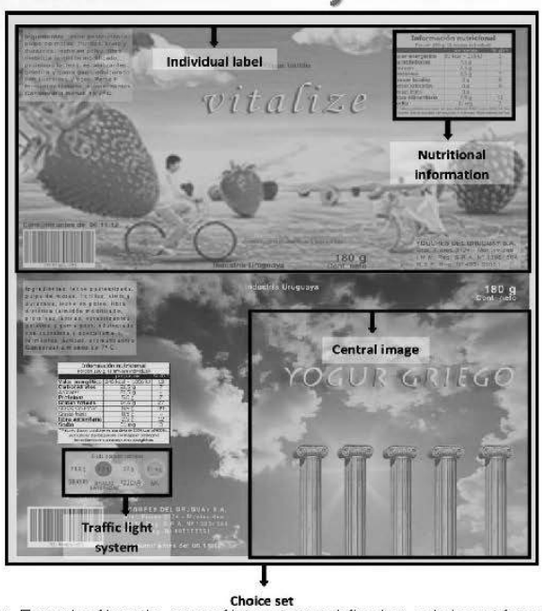
Rational consumers tend to mainly rely on complex information while intuitive consumers tend to base their choice more on graphic cues than complex information.

	Strawberry			Plain		
	HRT	NT	LRT	HRT	NT	LRT
Image	11.3%	30.1%	34.9%	1.3%	15.4%	12.6%
Taste description	18.3%	16.2%	28.3%	6.0%	5.6%	9.5%
Probiotics claim	26.0%	24.2%	24.0%	35.0%	32.5%	41.1%

- **Consumption motivation might be a critical factor determining cognitive information processing for making a food choice.**
- **Evidence obtained from eye-tracking technique supported the interaction between thinking style and consumption motivation found in conjoint results.**

didn't.

Influence of rational and intuitive thinking styles on food choice



(G. Ares et al., 2014)

- Consumers who relied on intuitive thinking style tended to engage in less thoughtful processing of the labels and to take into account different variables when making their choices than consumers who prefer rational thinking.

- **Thinking style affects information processing and consumer choices when evaluating food labels.**
- **Understanding how thinking style influences consumer choices has potential implications for the design of communication strategies aimed at changing dietary patterns.**

Fig. Example of how the areas of interest were defined on a choice set for calculating eye-tracking measures

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Part II - Summary & Conclusion

- To realize the consumer-driven product/package design, it is critical to better understand the consumers' holistic perceptual product usage experience and food-consumer interface.
- Behavior measures and qualitative observation methods and interview techniques can be integrated with the quantitative perceptual measures to reveal important consumer evidence for product quality attributes.
- Such measurement techniques include ….
  - Ethnography linked with the 'double-faced applicability' test methods
  - Eye-tracking with measurement of choice-behavior (discrete choice experiments)
- Further research and validations are needed for establishing the consumer semantic/language library and sensory space.
- Further research into implicit consumer measures are needed for better understanding of consumers' implicit learning of food preference and use of such learnings into food innovation.

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Acknowledgements

Ewha Womans Univ. Food Design/Ergonomics Lab. members and academic & industrial collaborators

Prof. Kim, Kwang-Ok
Prof. Kim, Young-Suck
With Dr. Hautus, Michael
& Dr. Bom-Frost

CJ CHEILJEDANG
Coca-Cola
The Institute for Perception
Unilever
The University of Auckland NEW ZEALAND
Kimberly-Clark Corporation
UC DAVIS University of California, Davis
UNIVERSITY OF COPENHAGEN
LOTTE
NONGSHIM

Lab. Mebers with
Unilever R&D collaborators

Dr. van Hout, Danielle
Dr. Hopkinson, Andrew
Dr. Dessirier, Jean-Marc
Dr. Blot, Kevin
Dr. Jansen, Frans-Jos
Dr. Giesbrecht, Timo
Dr. Zandstra, Liesbeth
& Groeneschild, Chantalle

With Prof. O'Mahony, Michael
Dr. Ishii, Rie
& Dr. Rousseau, Benoît

Lab. Members with
Dr. Polashock, Vicky
Dr. Keep, Greg
& Lee, SeulAh

Many other leading scientists who inspired me to enjoy this topic
Prof. Köster
Dr. Meiselman
Dr. Prescott
Dr. Cardello
Dr. Ares

Lab. members with
Dr. MacFie, Hal
& Dr. Jaeger, Sara

DTU

Prof. Brockhoff, Per Bruun
& Dr. Christensen, Rune H B

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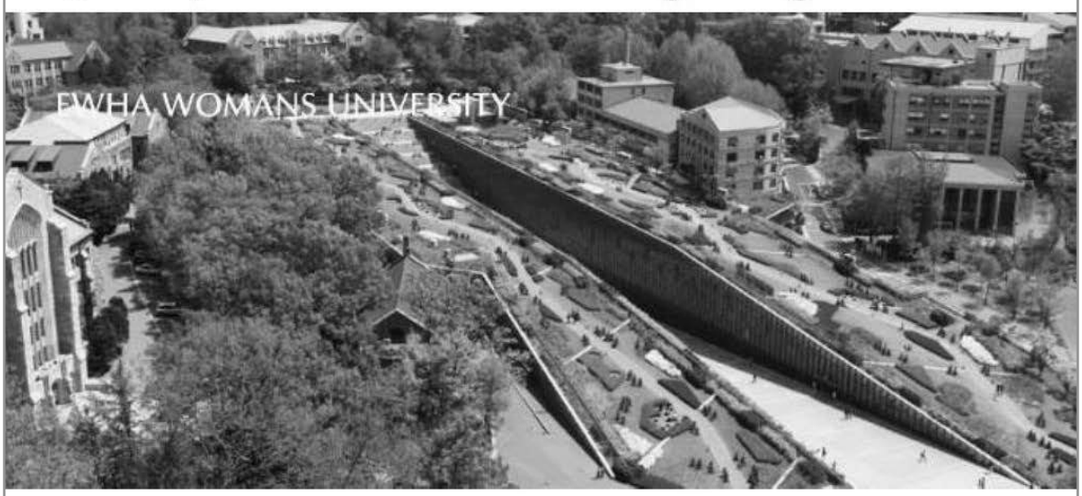
Food Design/Ergonomics Lab.
Department of Food Science & Engineering



Thank You!

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기술강연 3 | Session 3

Innovation in Food Ingredients: Unlocking the Power of Digestive Health and Intestinal Microbiota
식품성분의 혁신 : 소화기 건강과 장내미생물의 힘을 되찾다

Pascal RONFARD / President, Group SOLACTIS SAS

기술강연 3

식품성분의 혁신 : 소화기 건강과 장내미생물의 힘을 되찾다

파스칼 론파드

Group SOLACTIS SAS
회장

- **학력**

2005 –	Louvain (B) – UCL	최고경영자 과정 – 혁신 경영
2002 –	Paris (F) – University pantheon Assess	비즈니스 법 석사
1987 – 1990	Paris (F) – HEC	비즈니스와 기업가정신 – Grande Ecole

- **경력**

2013 – **현 재**	Groupe SOLACTIS	회장 겸 대주주
2007 – 2013	SOLVAY	식품&건강 프로그램 매니저 / 기업 비즈니스 개발 –M&A 업무
2000 – 2007	SOLVAY	비즈니스 개발 애널리스트 – 식품 원료
1998 – 2000	SOLVAY POLYOLEFINS EUROPE	세일즈 매니저 – 식품 패키징
1995 – 1998	SOLVAY PVC	비즈니스 부서관리
1991 – 1995	Intercargo	매니저 – 시드니 /마르세이유 지점

- **소개글**

2013년 이래로 파스칼 론파드(Pascal RONFARD)회장은 **미생물 부문을 적극적으로 추진하며 과학적으로 입증된 건강효과를 제시하여 Solactis**를 식품성분 및 원료사료 부문의 선두주자로 이끌어왔다. 이러한 노력의 결과, 많은 기업들이 추구하는 감독기관의 인증을 받게 되었다: **유럽** 2건, **한국** 1건 건강강조표시

2015년, Groupe SOLACTIS는 파리 외곽에 있는 저명한 과학캠퍼스인 《**INRA-domaine de Vilvert**》에 **R&D** 센터를 개설하였다.

론파드 회장은 전문가 그룹 《**HEC-Groupement Agro**》의 이사회 위원이며 **University Paris 6 (Pierre et Marie Curie)**의 객원전문가(**visiting expert**)이다.

론파드 회장은 **HEC** 경영대학을 졸업하였으며 **Paris II University** 기업법 전공 석사학위를 취득하였다.

Session 3

Innovation in Food Ingredients: Unlocking the Power of Digestive Health and Intestinal Microbiota

Pascal RONFARD

Groupe SOLACTIS SAS

President

- **Educational Background**

2005 –	Louvain (B) – UCL	Executive Education – Innovation Management
2002 –	Paris (F) – University pantheon Assess	Master degree in business law
1987 – 1990	Paris (F) – HEC	Business and entrepreneurship – Grande Ecole

- **Work Experience**

2013 – Present	Groupe SOLACTIS	President and major shareholder
2007 – 2013	SOLVAY	Program Manager Food & Health / Corporate Business Development – M&A operations
2000 – 2007	SOLVAY	Business Development Analyst – Food ingredients
1998 – 2000	SOLVAY POLYOLEFINS EUROPE	Sales Manager / Food packaging
1995 – 1998	SOLVAY PVC	Business Unit Management
1991 – 1995	Intercargo	Manager – Sydney / Marseilles branches

- **A Brief Introduction**

Since 2013, Pascal RONFARD has positioned the company as a leader of food and feed ingredients, **active on the microbiota** and **delivering scientifically proven health benefits**. This positioning has been rewarded by highly sought regulatory recognitions: **2 European** and **1 South Korea** official health claims.

In 2015, Groupe SOLACTIS has located his R&D center in the renown Science Campus “INRA–domaine de vilvert”, outside of Paris.

Mr. Ronfard is member of the board of the Professional group “HEC–Groupement Agro”, and visiting expert at University Paris 6 (Pierre et Marie Curie).

Mr. Ronfard is a graduate of the HEC business School and holds a Master degree in Corporate Law, from Paris ll University.

초록

식품성분의 혁신 : 소화기 건강과 장내미생물의 힘을 되찾다

장내미생물에 대한 연구가 진행될수록 미생물의 생리학적 기전에 대한 이해와 함께 더 많은 건강효과가 발견되고 있다.
새로운 박테리아를 위한 견고한 하우징, 미성숙 박테리아 종의 건강한 증식, 심지어 병원성 박테리아 개체군의 감소의 유도까지 새로운 기능들이 지속적으로 입증되고 있다.
이렇게 성장하고 있는 과학의 중심에서, 예상치 못했던 대단히 흥미로운 핵심적인 역할을 전통적인 음식이 수행하고 있다. 전통적인 음식으로부터 출발하여 단계적인 혁신을 통해 오래 된 지식과 첨단 과학에 기초한 새로운 화합물을 정의할 수 있다.
Pascal RONFARD 회장은 이러한 발견의 세계에 대한 내용과 함께 Solactis®의 식품성분으로 강화 된 맛있는 음식을 섭취하는 세계 인구를 위한 새로운 건강효과를 발견하기 위한 SOLACTIS 그룹의 노력을 소개할 것이다.

Abstract

Innovation in Food Ingredients: Unlocking the Power of Digestive Health and Intestinal Microbiota

The more the intestinal microbiota is explored, the more health benefits are identified, together with their physiological mechanisms.
New functions triggering sound housing of new bacteria, the healthy development of under-developed bacteria species, or even the reduction of pathogenic bacteria population, are patiently evidenced.
In the center of this evolving science, traditional foods may turn out to play unexpected and fascinating key roles. From there, step-by-step innovation enables to define new compounds, both based on heritage knowledge and most acute sciences.
This is this world of discoveries that Mr Pascal RONFARD will present, and will also define how Groupe SOLACTIS is endeavouring to uncover new health benefits for the population tasting good food, enriched with Solactis(r) ingredients.

Innovation in food ingredients
Unlocking the power of digestive health and intestinal microbiota

Pascal RONFARD, Groupe SOLACTIS SAS

Unlocking the power of digestive health and intestinal microbiota

I. **New explorations of gut microbiota**

II. New functions evidenced

III. Traditional foods play unexpected key roles

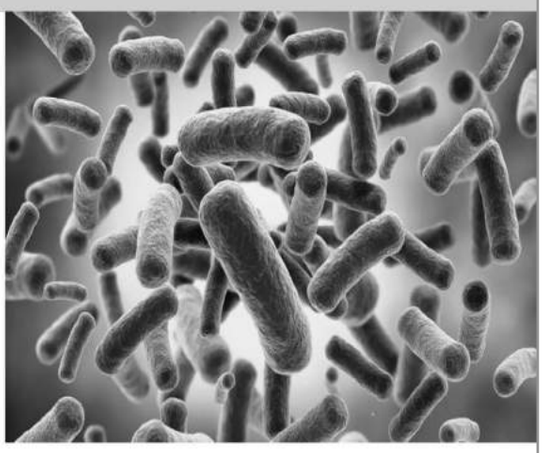
IV. New ingredients for better food

FOODPOLIS
Vitagora French Delegation
7th International FoodPolis Conference – November 15th 2017
Advanced technologies in food and beverage for consumers well-being

Microbiota, a new world to discover

Key role of digestive tract in body physiology

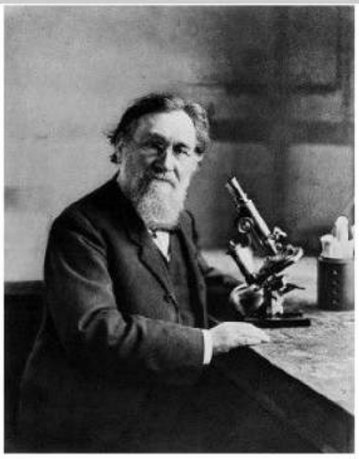
Solactis Group develops health-benefits linked to intestinal microbiota activities in humans and animals

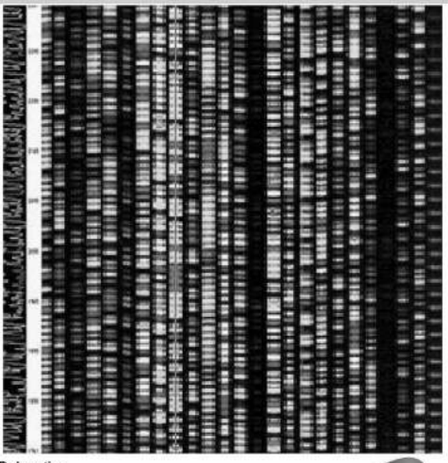


FOODPOLIS

Vitagora French Delegation
7th International FoodPolis Conference – November 15th 2017
Advanced technologies in food and beverage for consumers well-being

Heritage… or latest breakthroughs?





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Advanced technologies in food and beverage for consumers well-being

Unlocking the power of digestive health and intestinal microbiota

I. New explorations of gut microbiota

II. New functions evidenced

III. Traditional foods play unexpected key roles

IV. New ingredients for better food

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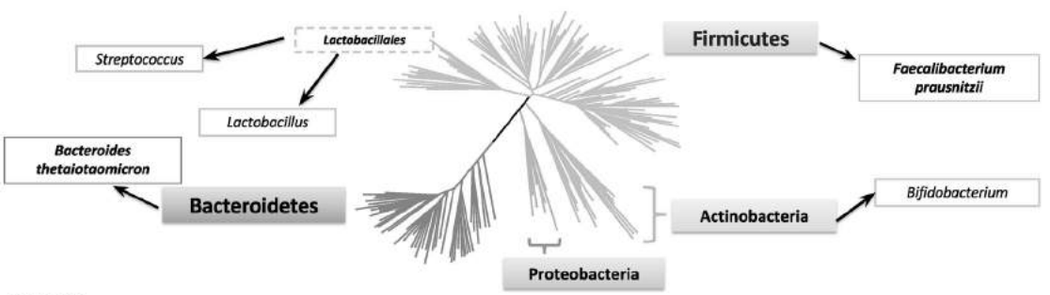
Diversity of intestinal microbiota

2 major phyla: Firmicutes and Bacteroidetes

2 minor phyla: Actinobacteria and Proteobacteria



Adapted from
Dethlefsen *et al*, Nature, 2007
Ley *et al*, Science, 2008
Tap *et al*, Environ Microbiol, 2009

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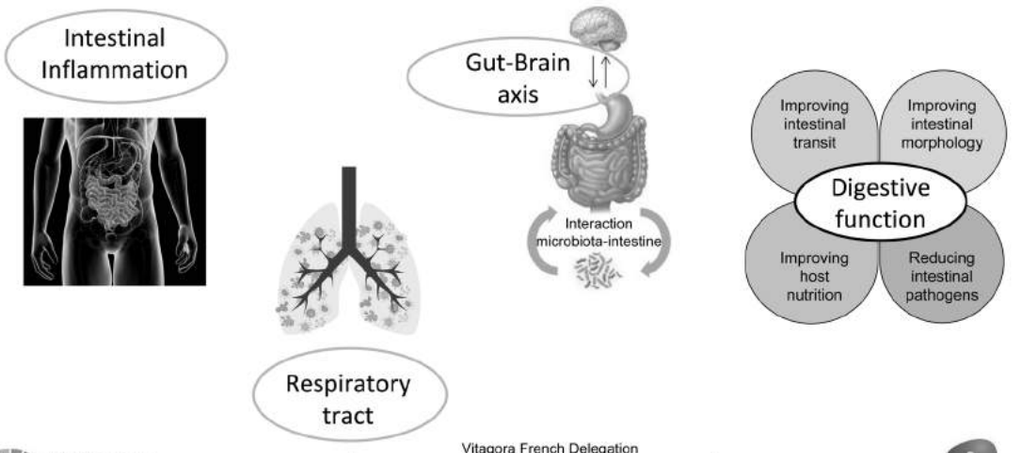
Insights into the role of microbiota in health



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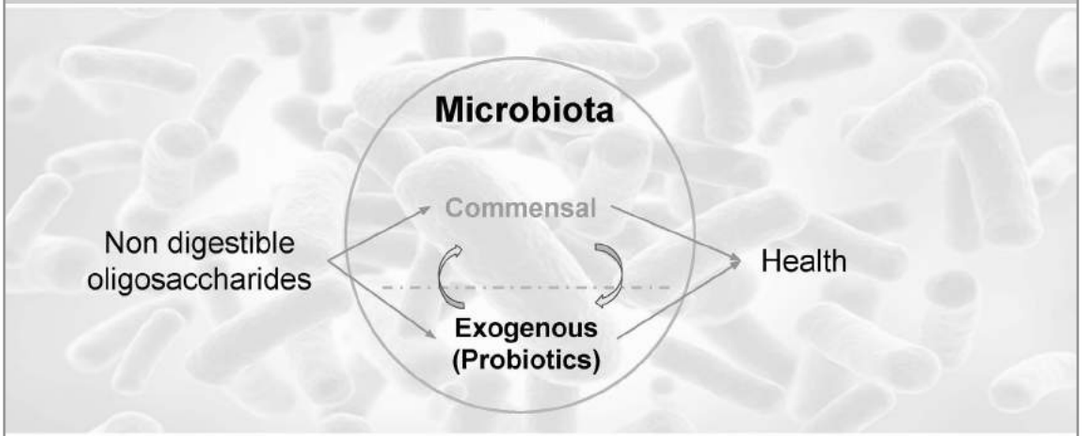
Implication in health and well-being



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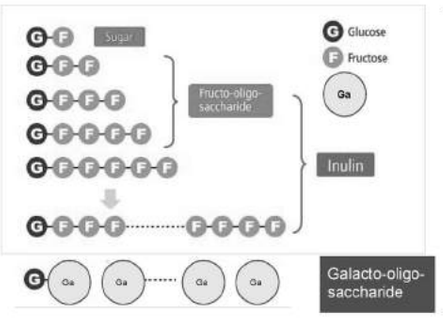
Where does innovation come from?



Marketed since the late 90'

Diverse combinations: represent "groups of carbohydrates"

Important accumulated science

Solactis® Galactofructose / lactulose

Solactis® Galactofructose

Galactofructose **HP (High Performance)** Galactofructose **STD (Standard)**

Heritage - first use in 60' - traditional and renown for its efficiency in South Korea

Defined and clear composition

Strong science, with **pharma approach**

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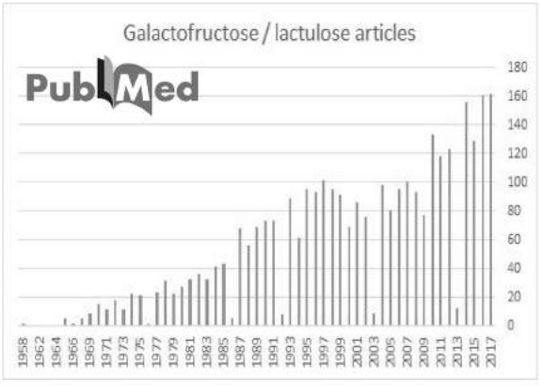
Scientific articles on galactofructose

Galactofructose / lactulose articles



Health Benefits

- **Bifidogenic / Prebiotic effect** : stimulates selectively the growth and the activity of good bacteria in the colon and contributes to the reduction of the pathogenic bacteria.
- **Better bowel function / Digestive comfort** : contribution to the regulation of the bowel movement reducing the episode of constipation and hard stool,
- **Boost Immune Defense System**: By eliminating pathogenic bacteria contributes to reinforce the immune defenses of the body.
- **Mineral & Nutrient Absorption**: enhance the absorption of Minerals and Nutrients.

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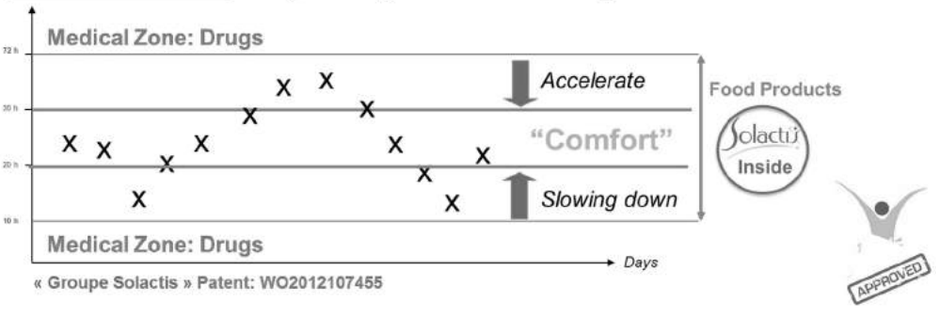
Solactis® galactofructose/lactulose: innovation

Unique Concept

Better bowel function : A unique concept "Feel Good – Feel Regular"



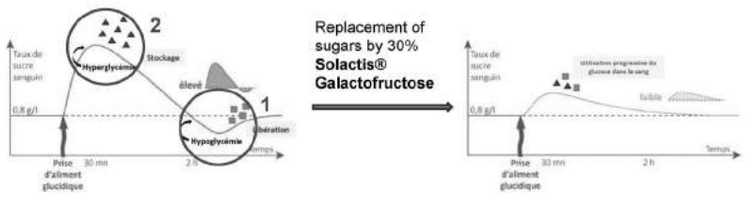
« Groupe Solactis » Patent: WO2012107455

Patent obtained in 04/2017

Solactis®: New Health Claim

Scientific Evidence

NEW Approved Health Claim by EFSA Reg 854/2016



1. Slow Release of Glucose for an efficient Energy management
2. Preventing fat storage for a better weight control

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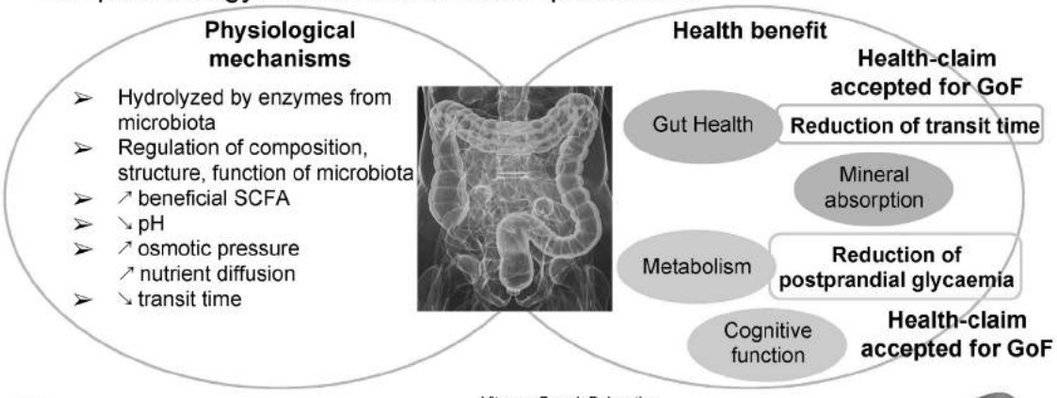
Carbohydrates development

Complex biology: sustainable and complete effect



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Solactis® SMO: the latest innovation in infant nutrition solutions

The new generation of NDO :

- **Solactis® SMO (Selected Milk Oligosaccharides)** is a powder characterized by a specific polymer structure with selected monomers and short polymerization degree (DP2 → DP6)
- Stimulation of the growth & the activity of beneficial bacteria and a higher concentration of Bifidobacterium
- Gut Microbiota diversification closer to breastfeeding
- Softer stool and Immune protection

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경청해 주셔서 감사합니다.

Thank you for your attention

Groupe SOLACTIS SAS in South Korea:

TRI-ON International
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+82.2.443.8720 I +82.2.2117.0917(Dir) I Fax +82.2.443.8721

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기술강연 4 | Session 4

Logistics Packaging versus Packaging Logistics
물류가 이끄는 패키징, 패키징이 이끄는 물류

김종경 / 한국건설생활환경시험연구원 팀 리더

기술강연 4

물류가 이끄는 패키징, 패키징이 이끄는 물류

김 종경

국제 사업 / 한국건설생활환경시험연구원

팀 리더

- **학력**

2008 – 2014	Michigan State University	SCM
1993 – 1996	Michigan State University	패키징
1986 – 1993	대구대학교	식품 공학

- **경력**

2015 – 현 재	한국건설생활환경시험연구원	수석연구원
2014 – 현 재	국제안전수송협회(ISTA), 아시아태평양지부	의장
2012 – 2015	국가기술표준원	물류부문 국가표준 코디네이터
2003 – 2008	용인송담대학교	조교수 / 유통패키징학과
1998 – 2003	경북과학대학교	전임강사 / 패키징학과
1996 – 1998	한국 포장시스템연구소	컨설턴트 / 패키징

- **소개글**

김종경 수석연구원은 온도조절 상품 패키징 부문 20년의 연구 경력을 보유한 매우 숙련 된 국제 패키징 및 물류 전문가이다.

학생, 다양한 업계의 패키징 종사자를 대상으로 패키징 자재, 식품 패키징, CAD, 품질 관리 및 기타 부문에 대한 교육을 진행해 왔다. 다양한 패키징 문제에 관련 된 국가 및 지역 차원의 프로젝트를 진행하거나 혹은 관련 프로젝트에 참여했다. 시뮬레이션 기법으로 패키징 및 공급체인의 비용효과를 개선하기 위한 프로젝트를 이끌었다. 삼성전자 펀딩으로 진행 된 “물류 부문 패키징 혁신”프로젝트를 성공적으로 수행하였다. (2011년 4월 1일 – 10월 10일)

신규 구성 된 ISTA 아시아태평양 지부 초대 의장으로서 다양한 운송 패키징 관련 연구 및 컨퍼런스를 주도하고 있다.

한국 국가기술표준원의 코디네이터로서 물류부문 국제표준과 국내 표준을 기획, 개발 및 조율하였다. 한국 내 물류부문 표준화의 리더로서 복수의 프로젝트 및 TFT를 이끌었다.

TC122뿐 아니라 TC104, TC51 및 TC34 부문의 ISO 활동에 지난 12년 이상의 기간 동안 적극적으로 참여하였다. TC122 (패키징) SC4 / WG3 (재사용), TC122 / WG13 (RTS, 순환물류체계) 업무의 프로젝트 리더로서 ISO에 기여하였으며 최근에는 콜드체인 패키징, 우수유통관리기준 (GDP) 등의 프로젝트를 진행하였다

Session 4

Logistics Packaging versus Packaging Logistics

Jongkyoung (JK) Kim

Global Business / Korea Conformity Lab

Team leader

- **Educational Background**

2008 – 2014	Michigan State University	SCM
1993 – 1996	Michigan State University	Packaging
1986 – 1993	Daegu University	Food Engineering

- **Work Experience**

2015 – Present	Korea Conformity Lab	Head researcher
2014 – Present	Asia-Pacific division, International Safety Transit Association (ISTA)	Chair
2012 – 2015	Korea Agency for Technology and Standards	National Standard Coordinator for Logistics
2003 – 2008	Yong-in Songdam College	Assistant Professor/ Dept. of Distribution and
1998 – 2003	Kyongbuk College of Science	Full-time instructor/ Dept. of Packaging
1996 – 1998	Institute of Korea Packaging Systems	Consultant / packaging

- **A Brief Introduction**

A highly skilled international packaging and logistics professional with 20 years of research experience in the field of temperature controlled product packaging.

Trained students & industry workers in various areas of packaging including packaging materials, food packaging, CAD, quality control and many others. Conducted or participated various national & regional projects related to various packaging problems. Led a research to improve cost efficiency of packaging and supply chain with simulation technique. Led the “packaging innovation for logistics” project successfully funded by Samsung Electronics (April 1 – October 10, 2011)

Leads various transport packaging research and conference as the first chair of newly established ISTA Asia-Pacific division

As a national standard coordinator of Korea, planed, developed and coordinated international and national standards related to logistics. Led multiple projects and task force teams as a leader for logistics standardization activity in Korea.

Actively participates ISO activities more than 12 years in TC122 along with TC104, TC51 and TC34. Contributed to ISO as a Project Leader for TC122 (packaging) SC4 / WG3 (reuse) and TC122 / WG13 (returnable transport systems). Recent projects include cold chain packaging and Good Distribution Practice

초록

물류가 이끄는 패키징, 패키징이 이끄는 물류

패키징은 효율적이고 효과적인 물류운영에 중요한 역할을 한다. 패키징은 공급망의 핵심요소로 제품을 물리적 파손으로부터 보호하고 모든 물류 활동 (수송, 취급, 패킹, 보관, 폐기, 정보관리 등)에 영향을 미친다. 패키징은 단순히 물류의 하나의 기능이 아니라 물류의 처음부터 끝까지 영향을 미치고 있는 것이다.

전 스마트물류 국가표준코디네이터이자 현 국제안전수송협회 아시아태평양지부 의장인 연사는 포장과 물류활동 및 기능간의 상호관계를 설명하고 혁신적인 패키징이 물류의 효율에 어떤 영향을 미치는지, 또 반대의 경우는 어떤지 설명한다. 콜드체인(정온물류관리), 순환물류/포장, 스마트물류/포장, 리테일러 입장에서의 포장 및 라스트마일물류의 관계 등이 논의된다.

Abstract

Logistics Packaging versus Packaging Logistics

Packaging plays major role in the operation of efficient and effective logistics. Packaging is a key element of a supply chain, protecting the product from physical damage and affecting every logistical activity, such as transportation, freight handling, packing, warehousing, waste disposal and information management. Packaging is not just a function of logistics, but interacts with logistics from start to finish.

As a former national standard coordinator for smart logistics and a Asia Pacific division chair of International Safety Transit Association (ISTA), JK Kim explains interactions of packaging and logistics activities and functions, and addresses how an innovative packaging can influence efficiency of logistics and vice versa. Several examples such as cold chain (temperature controlled supply chain) logistics/packaging, returnable transport logistics/packaging, smart logistics/packaging and retailer' s view on packaging and last mile logistics are to be discussed.

물류가 이끄는 패키징, 패키징이 이끄는 물류

LOGISTICS DRIVEN PACKAGING AND/OR PACKAGING DRIVEN LOGISTICS

김종경, 한국건설생활환경시험연구원
JK Kim, Ph.D., Professional packaging engineer

Team leader, International Business, KCL
Chair, ISTA Asia Pacific Division
Former National Standard Coordinator for Smart Logistics

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Content

- **Interaction**
- Logistics innovation
- Smart packaging
- Outlooks

2

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Abstract

- Packaging plays major role in the operation of efficient and effective logistics. Packaging is a key element of a supply chain, protecting the product from physical damage and affecting every logistical activity, such as transportation, freight handling, packing, warehousing, waste disposal and information management. Packaging is not just a function of logistics, but interacts with logistics from start to finish.
- As a former national standard coordinator for smart logistics and a Asia Pacific division chair of International Safety Transit Association (ISTA), JK Kim explains interactions of packaging and logistics activities and functions, and addresses how an innovative packaging can influence efficiency of logistics and vice versa. Several examples such as cold chain (temperature controlled supply chain) logistics/packaging, returnable transport logistics/packaging, smart logistics/packaging and retailer's view on packaging and last mile logistics are to be discussed.

3

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Interaction between Packaging & Logistics

- Packaging not only protects the product from physical damage, but **affects the cost of every logistical activity**, such as transportation, freight handling, packing, warehousing, waste disposal, and information management.
- Paine (1981) states
  - *Packaging is a **co-ordinated system of preparing goods** for transport, distribution, storage, retailing and end-use.*
  - *Packaging is **the means of ensuring safe delivery** to the ultimate consumer in sound condition at minimum cost.*
  - *Packaging is a techno-economic function aimed at **minimising costs of delivery while maximising sales** (and hence profits).*

4

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The relationships between packaging and supply chain

- **Function of packaging in supply chain**
  - *Packaging, as a function of supply chain, affects multiple supply chain metrics and is influenced by various supply chain activities such as freight handling, packing, warehousing and waste management.*
- **Packaging cost in a supply chain**
  - Identifying measurable packaging cost metrics and maintaining consistency are very important when it comes to comparing the impact of different packaging systems on a supply chain.

5

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An example of interaction: Reusable and expendable shipping containers in a automobile company

6

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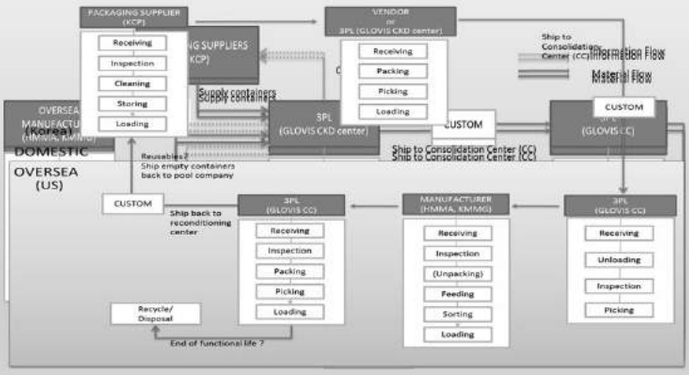
An International packaging and logistics flow of automotive parts



7

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Comparison of different cost elements of three packaging systems

Area of activity costs	Packaging systems		
	Expendable packaging system (EXPS)	Reusable packaging system (RPCS)	Rental packaging system (RENS)
Container purchasing	Depends on no. of containers needs		Depends on basic rental cost and no. of containers needs
Administration	Administration related costs including purchasing, receiving and sending	Need additional administration activity for replenishment process	Need additional activity for replenishment process, but need less activity for purchasing
Transportation	Forward transportation cost only	Forward and backhaul transportation cost	
Warehousing	Only need forward logistics process	Need additional activity for backhaul logistics	
After use	Disposal and recycling process	Affect less than expendable system. Replenishment process including reconditioning is required	Affect less than expendable system. Replenishment process including Reconditioning is required, but parts of the process is included in rental cost

8

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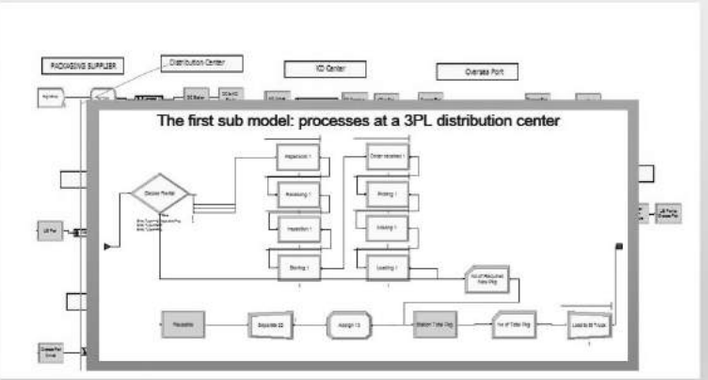
A simulation model (Arena software, Rockwell solution, Inc.)



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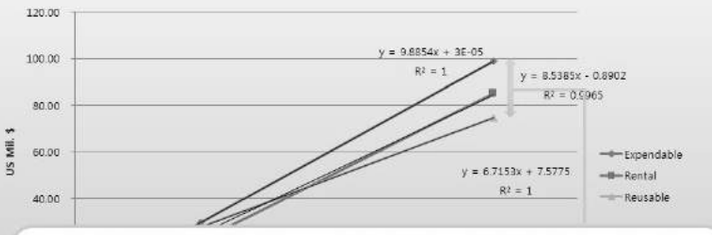
Simulation 1: Impact of expected life of reusable containers



The biggest difference between EXPS, RENS and RPCS is the number of containers used. As a result of the increased pallet loads of containers, total cost of EXP system is $98.9 million US dollars after 10 years' operation, which is 24.2 million dollars more than RPCS (Table 77).

Total cost comparison of different packaging systems depending on the different expected useful life of the container

10

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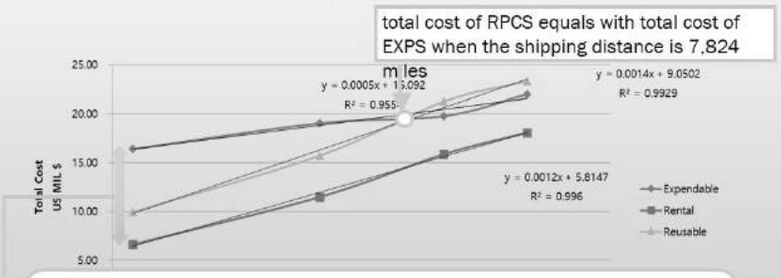
Simulation 2: Impact of distance (port to port comparison)



For shipping distance of 500 miles, average route time of RPCS reached 25.59 days compared to 2.34 days for EXPS because a company could have very poor container management system, a product has very slow inventory turnover, a company uses container for their warehouse inventory purpose, etc.

Total cost comparison of different packaging systems depending on the different route time

11

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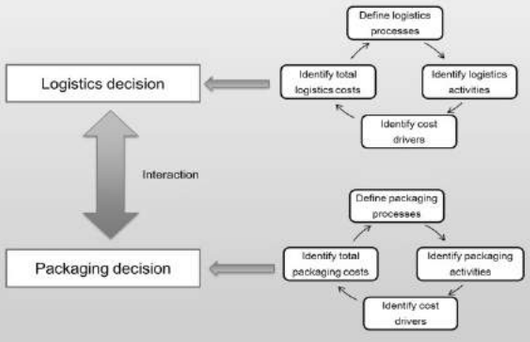
- Results: Any elements of either logistics or packaging processes will cause changing each activity, cost driver, each cost and eventually other costs.



Cost identification loops and interaction between logistics and packaging decision

12

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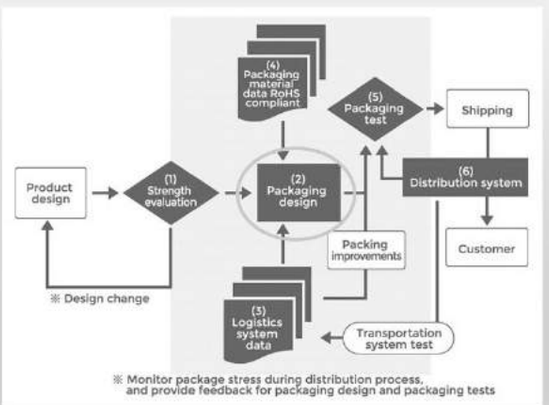
My favorite drawing from Hitatchi Transportation System



www.hitachi-transportsystem.com

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Content

- Interaction
- **Logistics innovation**
- Smart packaging
- Outlooks

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Logistics environment

E-commerce	Visibility & safety	Global supply chain
		

Need safe, stable and reliable supply chain networks

Extended role of Logistics management: From materials, equipment, testing standards to ICT convergence and service

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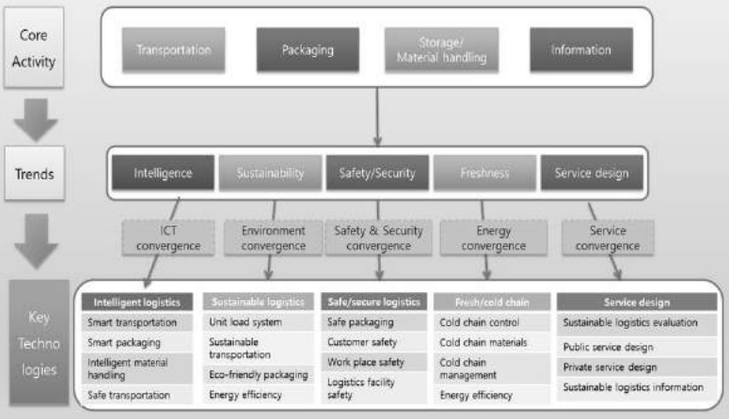
Key logistics technologies



* National Standardization Roadmap for Smart Logistics, 2015, KATS & KSA

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A Technology Roadmap for Logistics

Collaborative Logistics

- To enable all partners in the logistics ecosystem to work together and collaborate, optimize reliable relationships and therefore maximize value and benefit.

Adaptive Logistics

- To ensure operational excellence within the highly agile and short-notice planning and execution business in logistics.

Green & Sustainable Logistics

- To optimise the efficiency and ensure sustainability of logistics processes along the complete logistics value chain in the context of 'resource utilisation' – which is certainly also a major cost driver.

Transparent Logistics

- To provide full awareness regarding the situation in the physical processes of logistics, so that the right information is available which has impact on business processes – in the right quality, density, reliable and with sufficient content.

Intelligent Logistics

- : To enable people to do fast and right decisions in real-time, in all levels inside the company and cross-company, and support human skills and knowledge by intelligent IT tools.

The Alliance for European Logistics (AEL)

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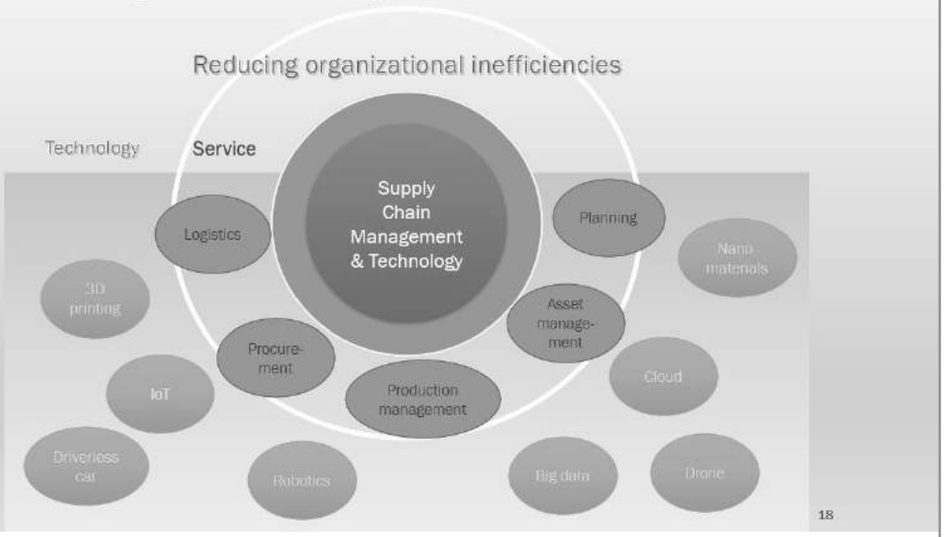
Real problem of logistics?



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Game changers

- *Amazon: Prime Air, KIVA*
- *Lowe's - LoweBot*
- *Google*
- *DHL: ProView*
- *UPS: PhamaSafe*
- *Connected home appliance with IoT capability*

get connected

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Kiva Robot

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Lowe's artificial intelligence robot - the LoweBot

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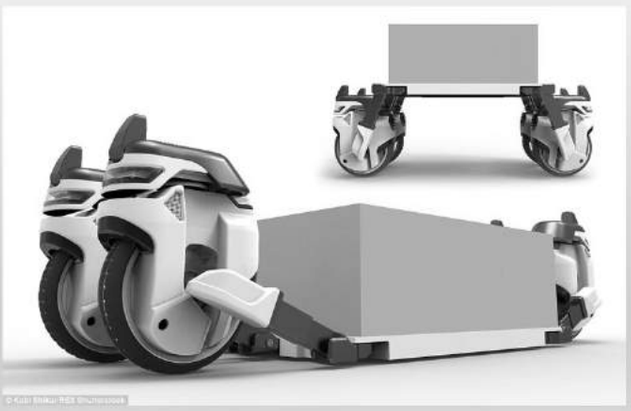
The Transwheel robots



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UPS PharmaSafe

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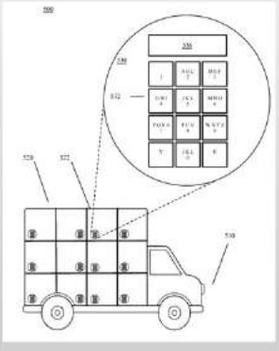
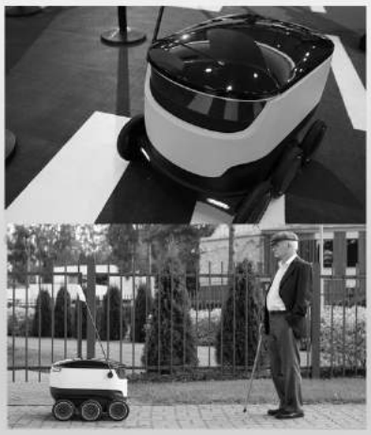
Last mile delivery : self-delivery robots





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Last mile delivery: Uberification

Instacart

Postmates

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DHL: Self-Driving Vehicles in Logistics

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Content

- Interaction
- Logistics innovation
- **Smart packaging**
- Outlooks

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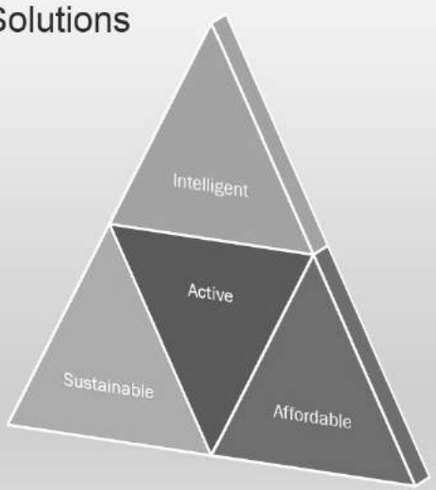
Smart Packaging Solutions



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Intelligent packaging

OPTION 01
Edible capsule label
가식성 의약품 라벨로
가짜약품 판별

OPTION 02
Printed electronics
인쇄전자기술을 이용한
소리나는 패키징

OPTION 03
Digital braille package
맹인을 위한 디지털
점자패키징

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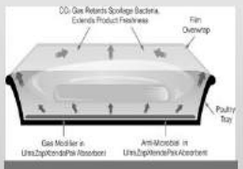
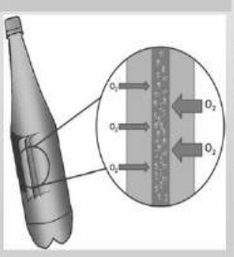
Active packaging



OPTION 01
Modified Atmosphere
Packaging
환경기체조절포장

OPTION 02
Oxygen Scavenger
탈산소제 패키징



OPTION 03
Anti microbial packaging
항균 패키징

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Sustainable

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Affordable and fun

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Target market

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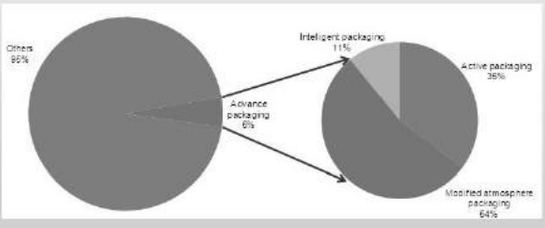
Global Active, Smart and Intelligent packaging



www.marketsandmarkets.com

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Medical packaging

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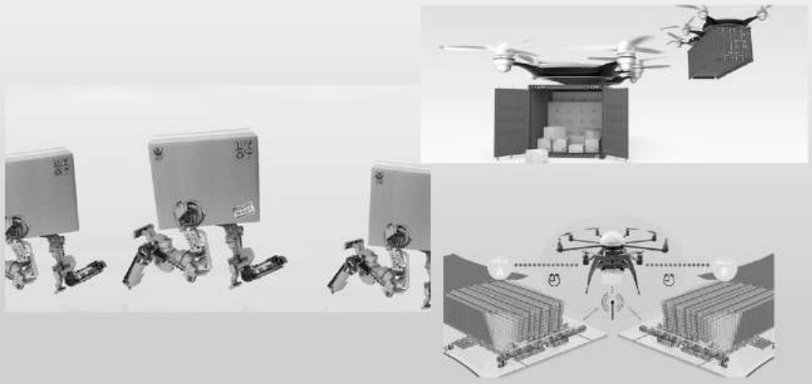
Unmanned Logistics



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Value

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Hardware vs. Software

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Smart ruler

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Smart tools

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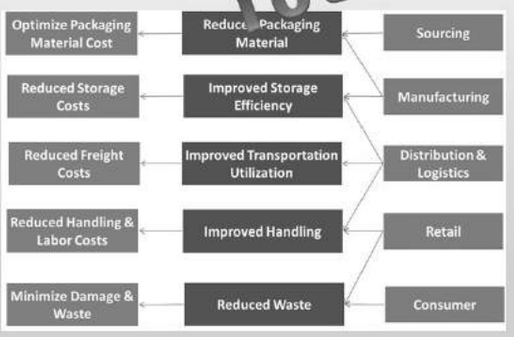
Cost is cost



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Various packaging options

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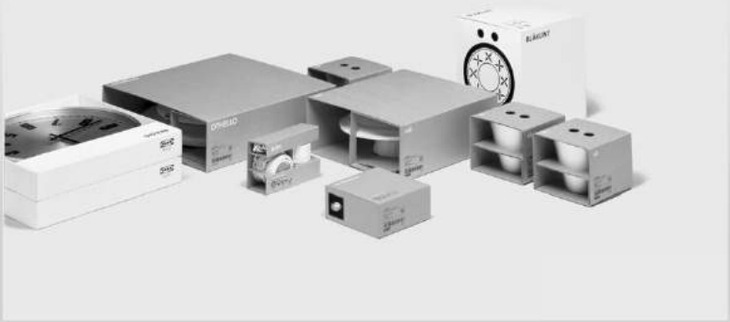
IKEA®



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Automation and integration in compact way

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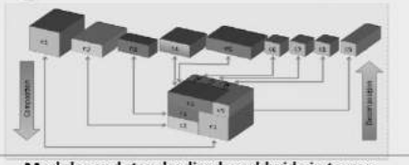
■ **Physical Internet** (Modular concepts)

Supporting π-Containers

π-movers

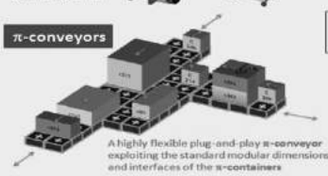
A fork-less lift exploiting the snapping and interlocking functionalities of the π-container

A π-container equipped with wheels snapped through its standard modular interfaces



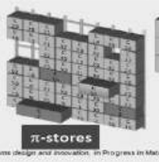
Modular and standardized worldwide in terms of dimensions, functions and fixtures

π-conveyors



A highly flexible plug-and-play π-conveyor exploiting the standard modular dimensions and interfaces of the π-containers

In π-stores, contemporary racking can be used, however innovations in storage technologies exploiting the functional characteristics of modular π-containers are bound to be exploited



π-stores

In π-stores, modular π-containers can be stacked as in container port terminals

Reference: Montreuil, B., R.D. Meller, E. Ballot (2010). *Towards a physical internet: the impact on logistics facilities and material handling systems design and innovation*. In Progress in Material Handling Research. Edited by K. Gue et al., Material Handling Industry of America, 23 p., 2010

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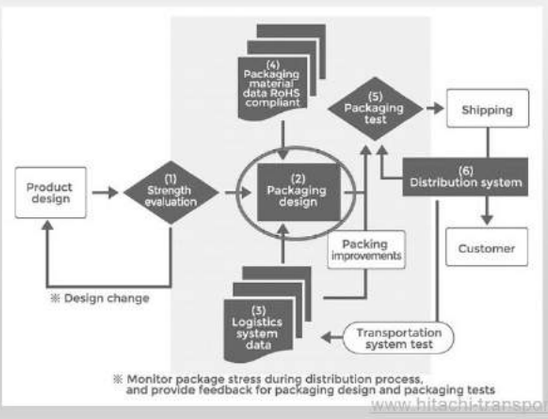
Again, Hitatchi



※ Monitor package stress during distribution process, and provide feedback for packaging design and packaging tests

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Fun! Sustainability!

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Pizza Hut box

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- Logistics innovation
- Smart packaging
- **Outlooks**

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Tough choice ahead: standardized or differentiated?

- Logistics innovation facilitating an integrated or a flexible system, and improving compatibility or performance of the packaging system.
- The packaging trade-offs between standardization and differentiation?
  - *New challenges ahead!*
- Packaging should not be considered a sub-system of logistics or marketing, but a strategically important area which contributes to overall supply chain performa nce.(Daniel Hellström, Fredrik Nilsson, 2011)

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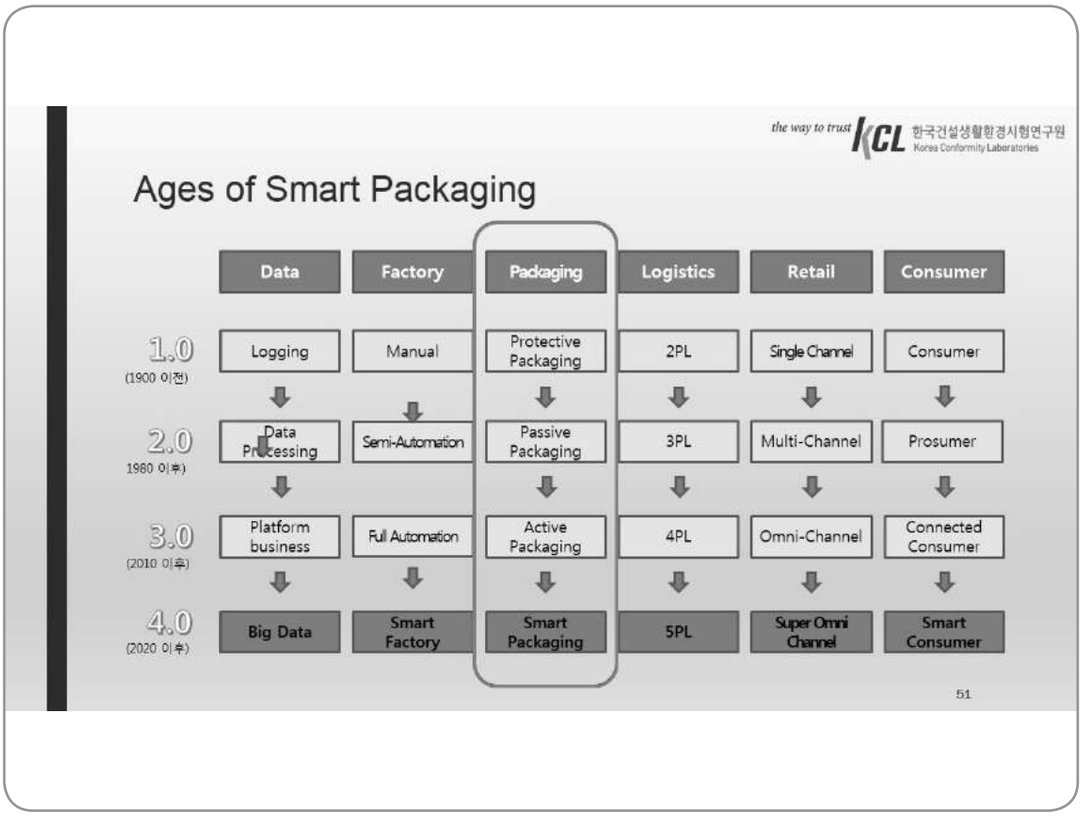
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Ages of Smart Packaging
Data
Factory
Packaging
Logistics
Retail
Consumer
1.0
(1900 이전)
Logging
Manual
Protective Packaging
2PL
Single Channel
Consumer
2.0
1980 이후
Data Processing
Semi-Automation
Passive Packaging
3PL
Multi-Channel
Prosumer
3.0
(2010 이후)
Platform business
Full Automation
Active Packaging
4PL
Omni-Channel
Connected Consumer
4.0
(2020 이후)
Big Data
Smart Factory
Smart Packaging
5PL
Super Omni Channel
Smart Consumer
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what is packaging 4.0?
4.0
PACKAGING 4.0
LOGISTICS 4.0
Digitalization
Automation
Connected
Material
Machinery
Men
Convergence
Sharing
Efficiency
Challenge and Opportunity
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감사합니다
Thank you~!
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JK Kim
logiscodi@naver.com

기술강연 5 | Session 5

Personal Lifestyle Assistant for Better Health through Nutrition: The COOK2HEALTH Project

영양을 통한 건강 증진을 위한 개인 라이프 스타일 보조 : COOK2HEALTH 프로젝트

Mariette SICARD / Team Manager, Group SEB

기술강연 5

영양을 통한 건강 증진을 위한 개인 라이프 스타일 보조 : COOK2HEALTH 프로젝트

마리테 시카드

Groupe Seb

팀 매니저

- **학력**

2007 – 2010	Agroparistech	식품 가공 (pHD)
2005 – 2006	Lyon university	인지심리학 석사
2001 – 2002	Dijon university	감각분석학 석사
1996 – 2001	Isara	식품 공학

- **경력**

2016 – 현 재	Groupe Seb	식품과학팀매니저(Food science Team manager)
2010 – 2016	Groupe Seb	혁신프로젝트 리더(Innovation project leader)
2007 – 2010	INRA	식품과학 박사
2002 – 2003	Renault trucks	감각분석 연구

- **소개글**

식품 복합시스템 모델링을 주제로 박사학위를 취득한 후 마리테 시카드는 (Mariette)는 새로운 스마트 조리기구 및 디지털 서비스를 개발하는 Groupe Seb 디지털 혁신팀에서 근무하였다. 2016년부터는 Cook2health 유럽 프로젝트를 이끌고 있다. 유럽혁신기술연구소 건강부문(EIT Health)의 펀딩으로 진행되는 본 임상연구를 통해 디지털 방식의 영양 코칭이 만성질환의 예방에 미치는 영향을 검증할 것이다.

Session 5

Personal Lifestyle Assistant for Better Health through Nutrition: The COOK2HEALTH Project

Mariette SICARD

Groupe Seb

Team Manager

- **Educational Background**

2007 – 2010	Agroparistech	Food process (pHD)
2005 – 2006	Lyon university	Master in Cognitive psychology
2001 – 2002	Dijon university	Master in sensory analysis
1996 – 2001	Isara	Food engineer

- **Work Experience**

2016 – Present	Groupe Seb	Food science Team manager
2010 – 2016	Groupe Seb	Innovation project leader
2007 – 2010	INRA	Food science pHD
2002 – 2003	Renault trucks	Sensory research

- **A Brief Introduction**

After a pHD on food complex system modelling, Mariette worked in the digital innovation team in group Seb to develop new connected cooking devices and digital services. Since 2016, Mariette leads the Cook2health European project. Funded by EIT health, this clinical study will test the impact of a digital nutritional coaching to prevent chronical diseases.

초록

영양을 통한 건강 증진을 위한 개인 라이프 스타일 보조 : COOK2HEALTH 프로젝트

건강에 해로운 라이프스타일은 만성질환 발병의 주요 요인이며 이러한 만성질환은 EU 보건의료체계에 막대한 재정적인 부담이 되고 있다. 신체 활동의 부족, 나쁜 식단과 비만은 암, 심혈관계 질환 및 대사이상에 있어 매우 주요한 위험 요인이며 각 질병의 발병율 및 조기사망율의 주요 원인이다. 임상연구 결과에 따르면 건강한 습관을 통해 다양한 질환이 예방 및 경우에 따라서는 호전될 수도 있다. 하지만 공중보건의료부문의 커뮤니케이션은 소비자의 습관을 바꾸는 데에 영향을 미치지 못했다. 유감스럽게도, 식도락가의 경우 종종 본인 식단의 건강성에 대한 잘못 된 판단을 내린다. (음식의 선택, 조리방식, 식사량, 식이 패턴) 뿐만 아니라, 식이행동에 영향을 미치는 상황적 영향에 대한 인지가 부족하며 변화에 대한 동기부여가 되어 있는 경우에도 그러한 좋은 의도가 건강한 행동으로 이어지는 데에 어려움을 겪는다. 가족 구성원 모두를 위한 전체 식사의 적절한 메뉴설계와 간편한 조리법을 제안하는 OFS 인터넷 앱은 조리에 대한 간편한 해법을 제시할 뿐 아니라 건강한 식이습관 및 라이프스타일을 점차적으로 발전시켜 나가는 과정에 도움이 될 것이다.

C2H의 2016년 목표는 3년 이상의 장기 프로젝트를 수행하기 위한 토대를 구축하는 것이다. 2016년에는 20명의 자원자가 참여했으며 2017년에는 그 수가 큰 폭으로 증가하여 유럽에서만 200명이 참여할 것으로 예상된다.
참여 파트너: Groupe Seb, Université Grenoble-Alpes, Aberystwyth University, Barcelona University
Cook2health는 유럽의 기업가 정신과 건강한 생활 및 활동적 노화를 위한 혁신을 촉진할 수 있도록 방법을 모색하는 EIT HEALTH의 지원금을 받았다.

Abstract

Personal Lifestyle Assistant for Better Health through Nutrition: The COOK2HEALTH Project

Unhealthy lifestyles are a major factor contributing to chronic conditions that impose a huge financial burden in EU healthcare systems. Insufficient physical activity, poor diet and obesity are significant risk factors for cancers, cardiovascular and metabolic disorders and leading causes of morbidity and premature mortality. Clinical studies indicate that different conditions can be prevented and sometimes reversed through adaptation of healthy habits. But the communication of Public Health failed to influence consumer to change their habits. Unfortunately, free-living individuals are often poor at judging the healthiness of their own diet (choice of meal constituents, cooking methods, portion sizes pattern of eating). Moreover, there is a lack of awareness of the contextual features influencing eating behavior and even where there is motivation to change, people have difficulty translating good intentions into healthy behaviors. By proposing suitable menu designs and easy recipes for the whole meal and all the family, OFS internet apps will bring easy solutions to cook and progressively develop healthy dietary habits and lifestyles.

C2H' s goal during 2016 is to lay the foundation of a more than 3 years larger project. It will include at least 20 volunteers in 2016 and exponentially 200 Europeans expected in 2017.
Partners involved : Groupe Seb, Université Grenoble-Alpes, Aberystwyth University, Barcelona University
Cook2health is granted by EIT HEALTH, the European institute of Innovation & Technology of Health seeking to accelerate entrepreneurship and innovation for healthy living and active ageing in Europe.

Personal Lifestyle Assistant for better health through nutrition : the COOK2HEALTH project

Mariette SICARD, Groupe Seb

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Groupe SEB, an historical know how on cooking devices with recipes

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Actifry, first nutritious and delicious success :

- Low fat fries (3 % fat vs 14%)
- 7 000 000 sold

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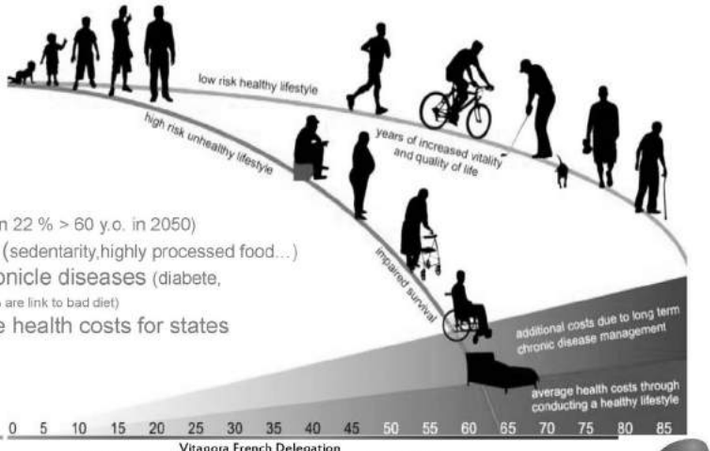
World health challenge:

- Ageing (more than 22 % > 60 y.o. in 2050)
- New way of life (sedentarity,highly processed food…)
- Increase of chronicle diseases (diabete, hypertension…,70 % are link to bad diet)
- Non sustainable health costs for states



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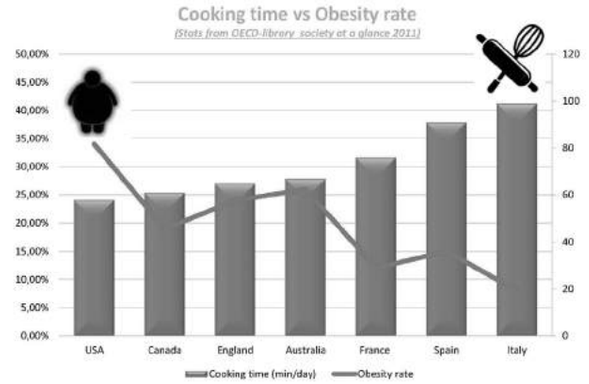
Cooking, good for health?



My actifry, my coach to cook at home

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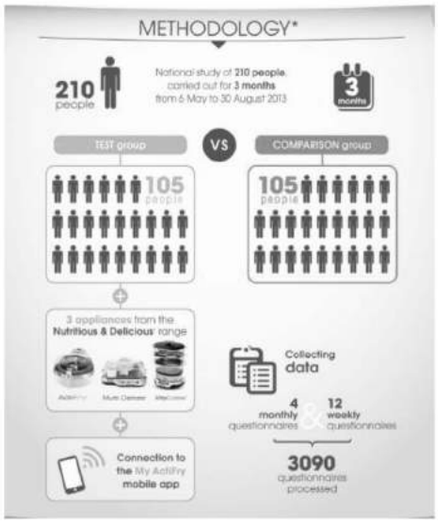

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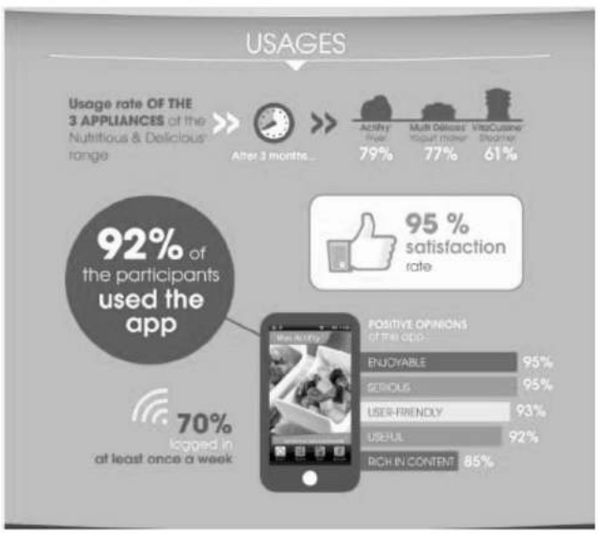

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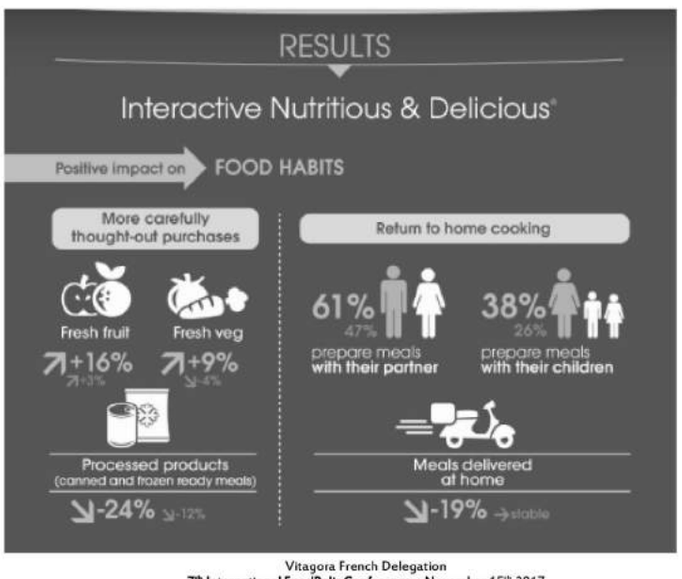

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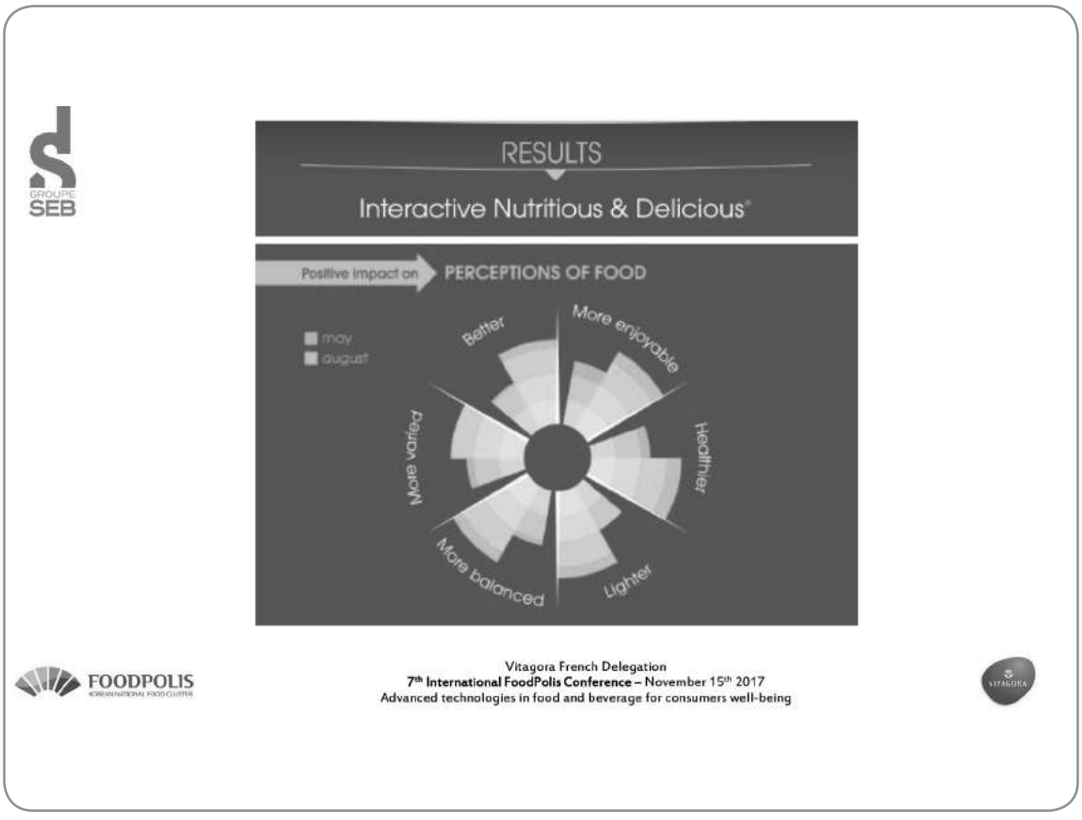
RESULTS
Interactive Nutritious & Delicious®
Positive impact on PERCEPTIONS OF FOOD
may
august
Better
More enjoyable
Healthier
Lighter
More balanced
More varied
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RESULTS
Interactive Nutritious & Delicious®
Positive impact on BODY SHAPE
71% reduced their waistline
81% of those who lost over 4 cm in waist circumference had used the application at least once per week
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Actifry & me coaching for Actifry smart

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And tomorrow?

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Key competitors in e-nutrition:

NestléHealthScience
Projet Iron Man

Roche

SANOFI

PHILIPS
TOUS LES JOURS FAIT MAISON
food4me.org
PHILIPS

amazon fresh

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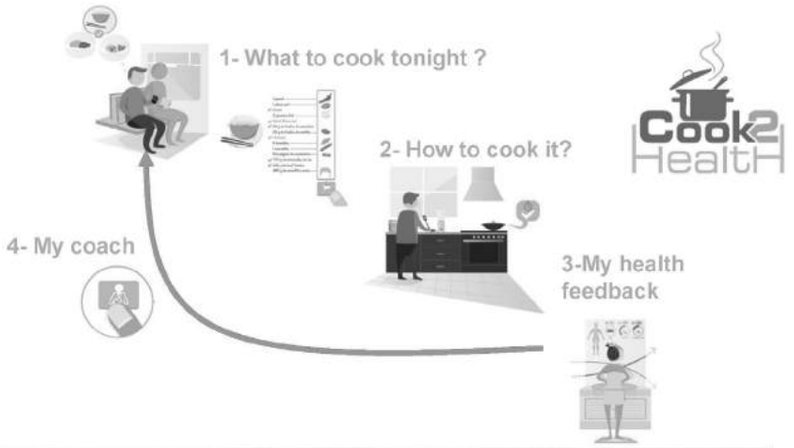
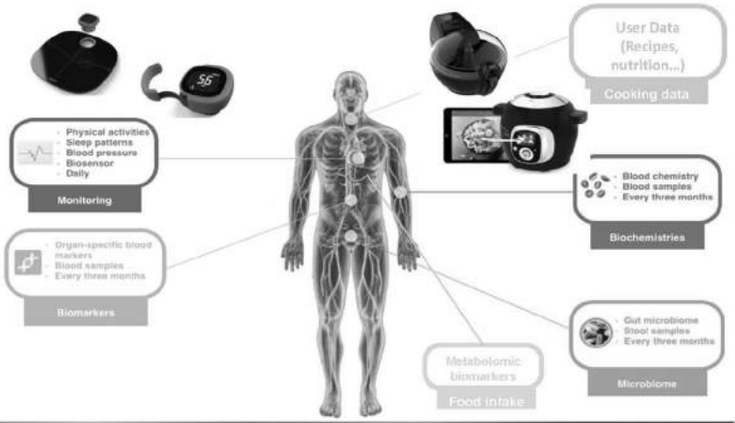
Cook2Health experience :



COOK2HEALTH project



Clinical test:

→200 volunteers
→UK & FR, 12 months
→30 health parameters

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EIT HEALTH : Top level expertise and networks

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Happening soon : personalized nutrition !



경청해 주셔서 감사합니다.

Thank you for your attention

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