

# **Consumer knowledge, attitudes and behaviour – the point of view of scientist**

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**(A) Introduction**

**(B) The Nutrition Behaviour Models**

**(C) Possibilities for Changing Behaviour by  
Application of Nutrition Behaviour Theory  
(Nutrition Communication Design)**

**(D) Conclusions – Final Remarks**

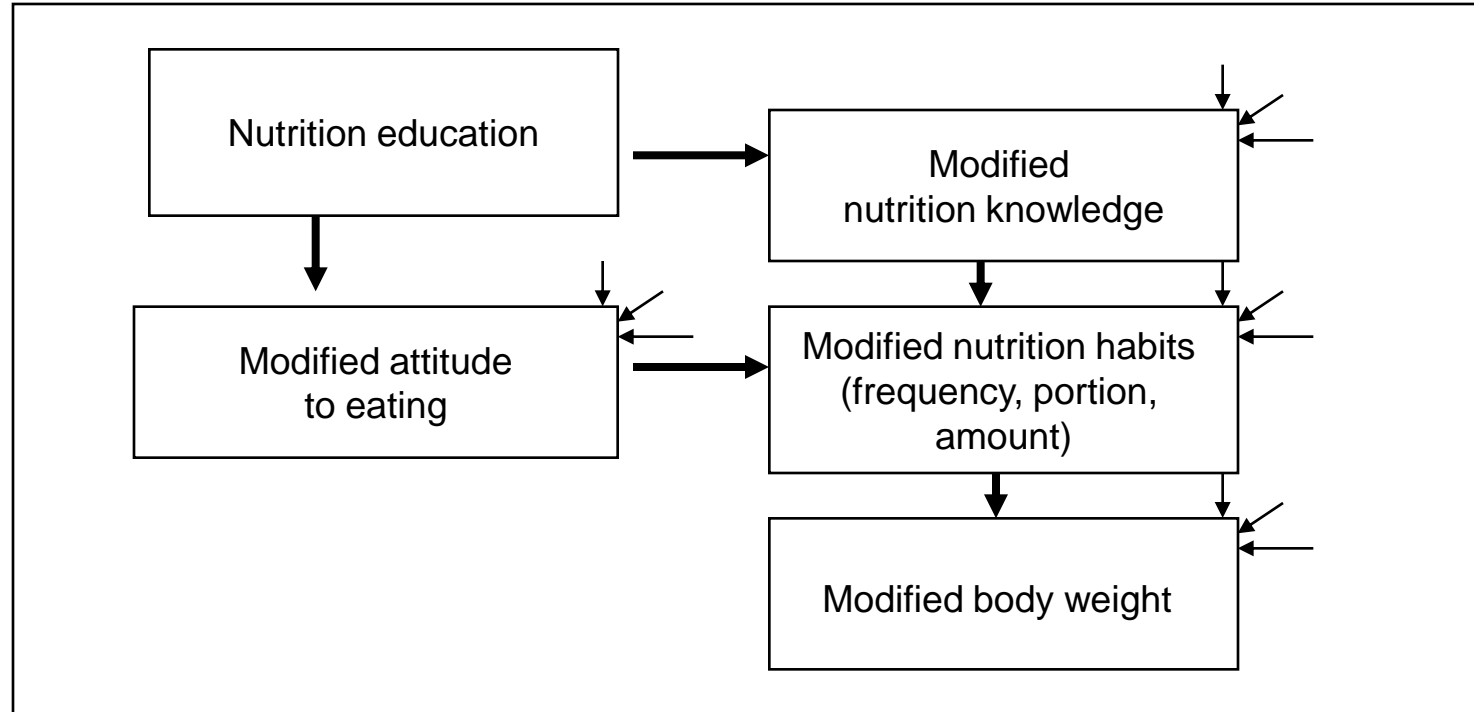
## (A) Introduction

Public health nutrition has the task to influence human's nutrition behaviour in the way to reach environmental and dietary goals, well being and health. Basic nutrition evidence has to be transformed into everyday behaviour.

In order to act target-orientated one has to know the theoretical backgrounds of human nutrition behaviour.

The experiences of previous efforts indicate, it is **not as simple**, as originally thought:: **Increase** in the right **knowledge** will **lead** automatically to **right behaviour**

Currently some express the opinion: **nutrition education failed**. It is almost impossible to alter behaviour by knowledge transfer and formal education.



Oltersdorf, U.: Beziehungen zwischen Ernährungswissen, Einstellungen zum Essen, Ernährungsgewohnheiten und Körpergewicht. Ernährungs-Lehre und –Praxis. Beilage zur Ernährungs-Umschau, Nr. 5+6, 1980

A prerequisite is the understanding of the determinants and mechanisms of human nutrition behaviour.

All everyday activities (habitual acting) are firmly controlled by bio-psycho-socio-ecological /cultural feedback-loops.

There are two principal input-output domains, one is related to substances (*metabolism; chemicals*) and the other to information (*communication; physical signals*)

The biological basis of behaviour is the response/reaction (R) of any organism (O) on any stimulus (S) (S-O-R-Model).

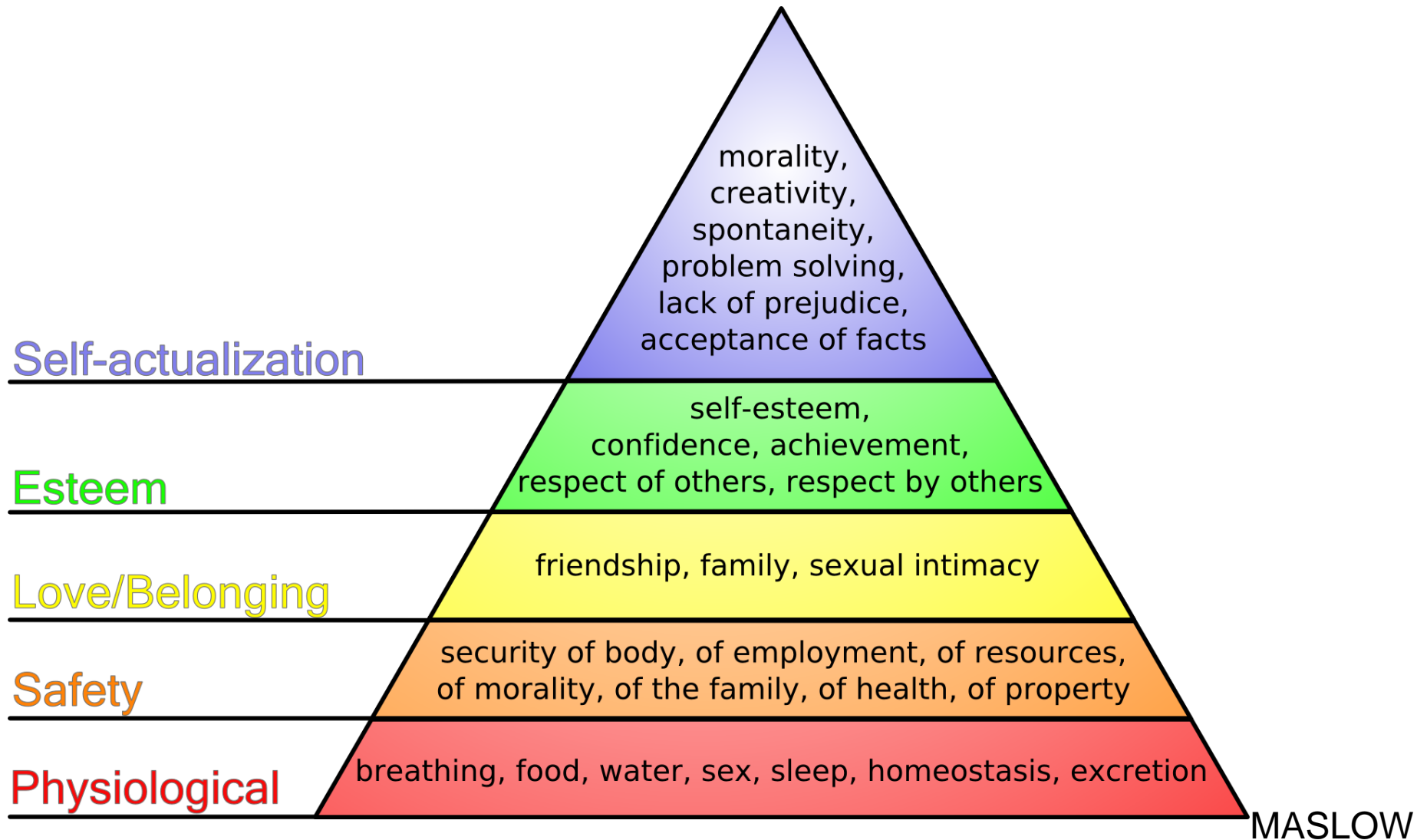
The ontogenetic development of behaviour is dependent on genetic programmes **and** on environment. Nutrients are involved to program the biological reaction (*nutrition programming*).

Aim is to present a broad scope leading to the bio-psycho-socio-ecological /cultural behaviour model.

## **(B) The Nutrition Behaviour Models**

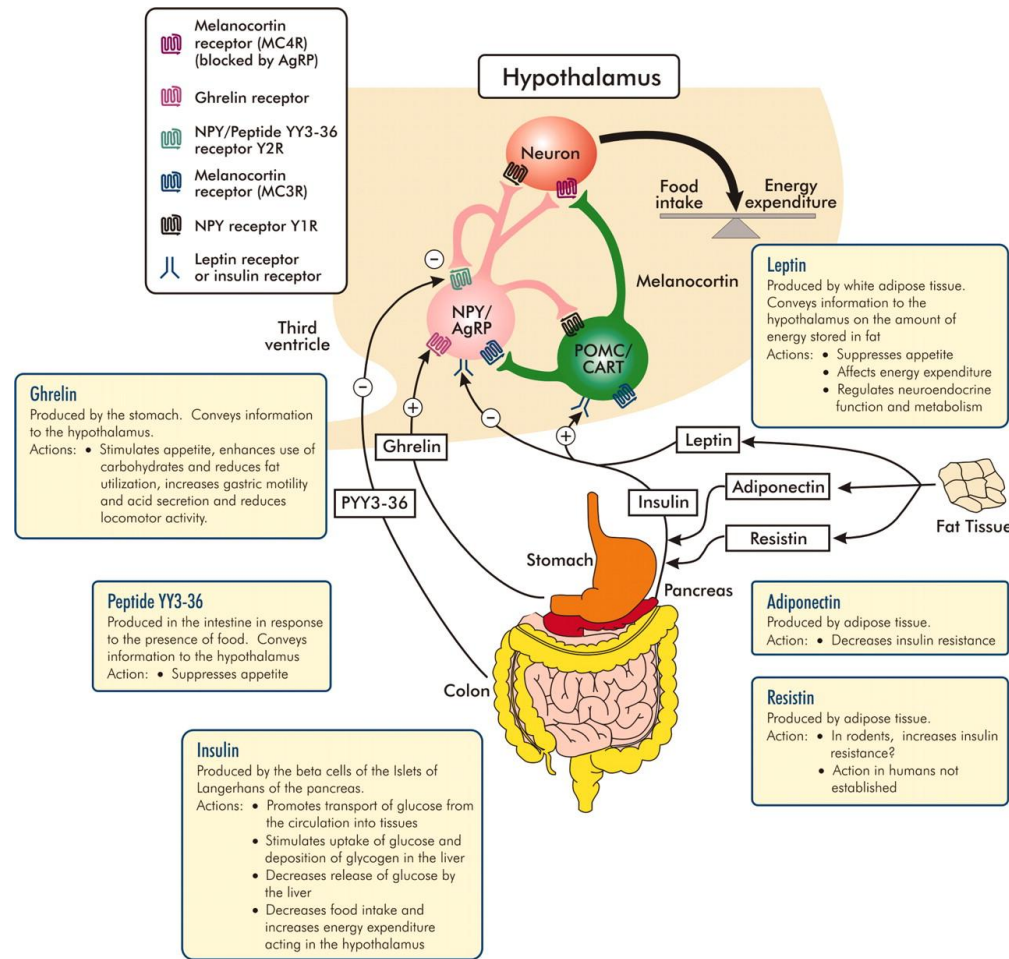
### ***(Ba) Nutrition behaviour has a biological basis.***

It is the *physiological task* to fulfil the basic need for nourishment of the organism

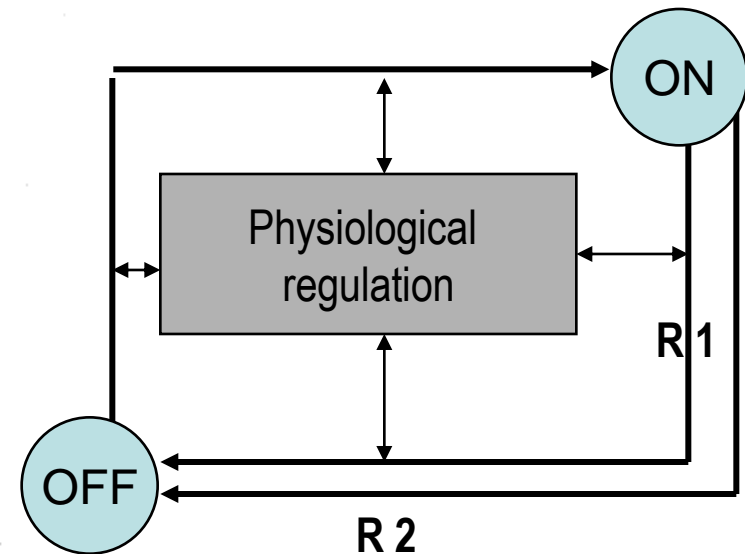
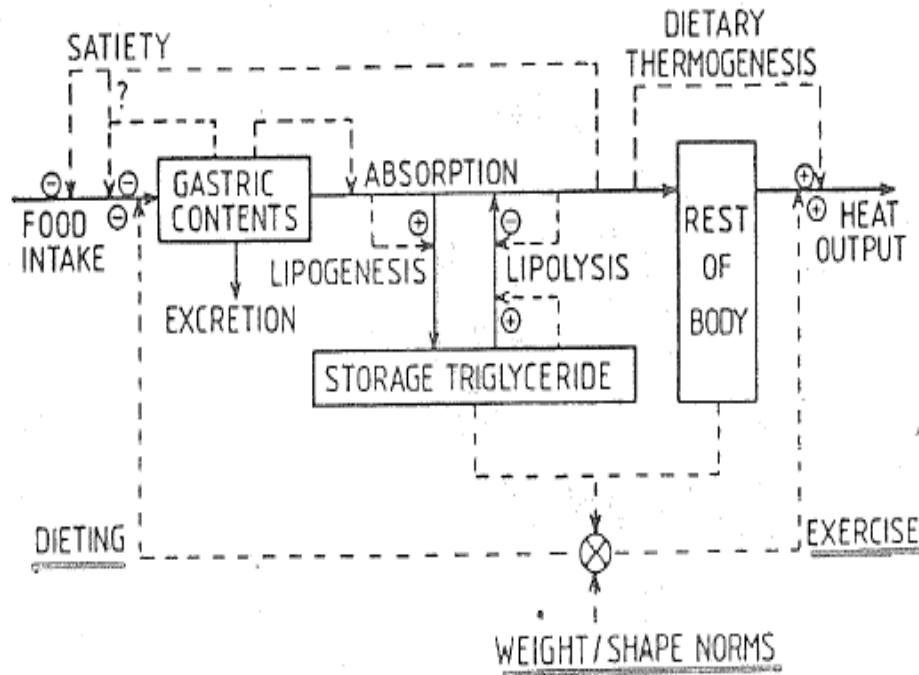




There are several internal signals inducing start of eating, hunger signals and several to stop eating, satiety signals. Signals are related to metabolites (e.g. glucose), hormones (GIPs) and neurological transmission, and coordinated in the central nervous system



# Physiological models are the core system of nutrition behaviour



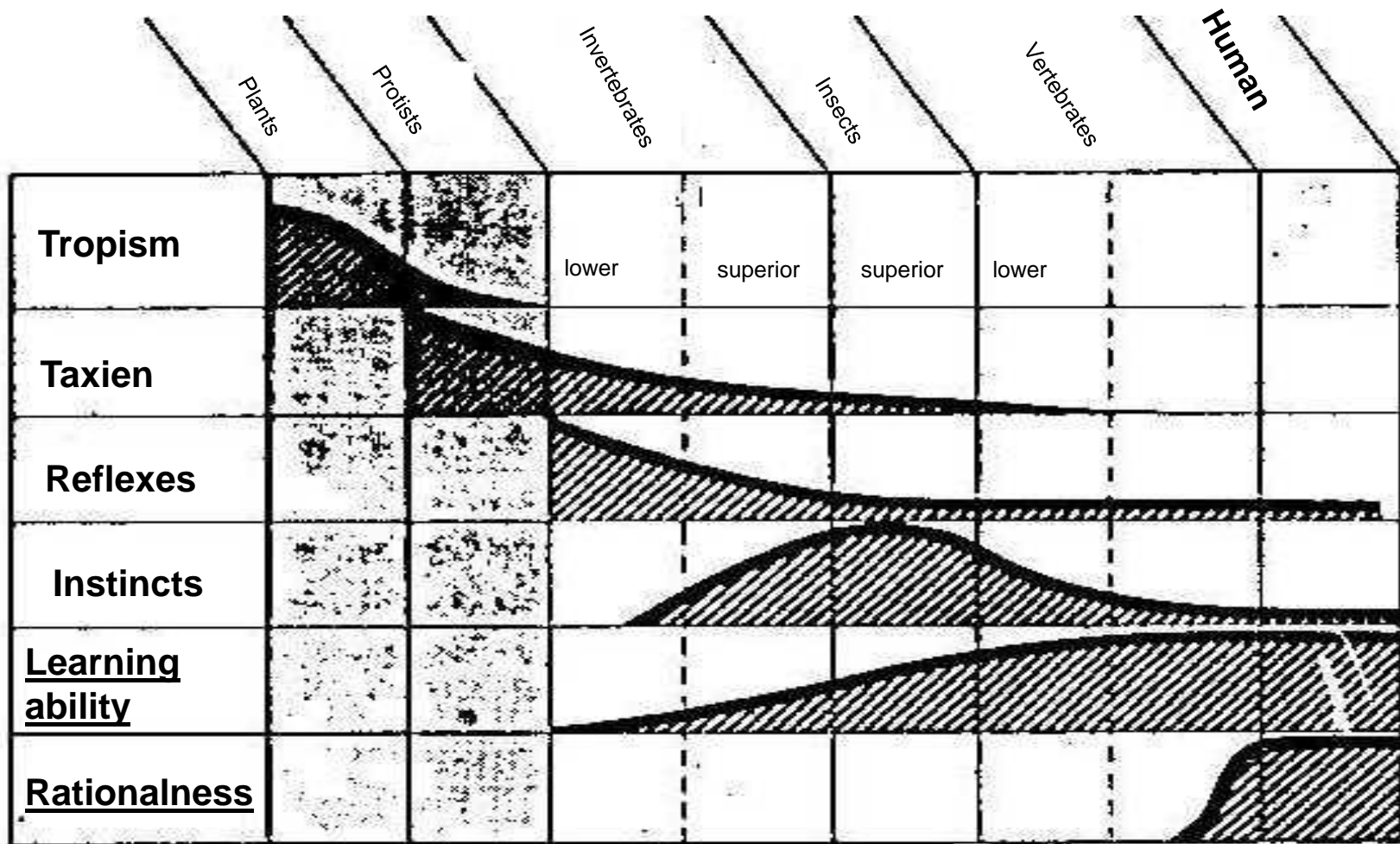
EMSIG-MARS, 1983

Booth, D. A.: A simulation model of psychobiosocial theory of human foodintake controls. Int.J.Vit.Nutr.Res. 58: 119 – 134 (1988)

Most physiological models are related to energy balance; e.g. glucostatic model.

Obviously there should be also similar regulation to other nutrients and food components (nutrient-specific hunger and satiety signals). There are physiological protective mechanisms against toxic substances.

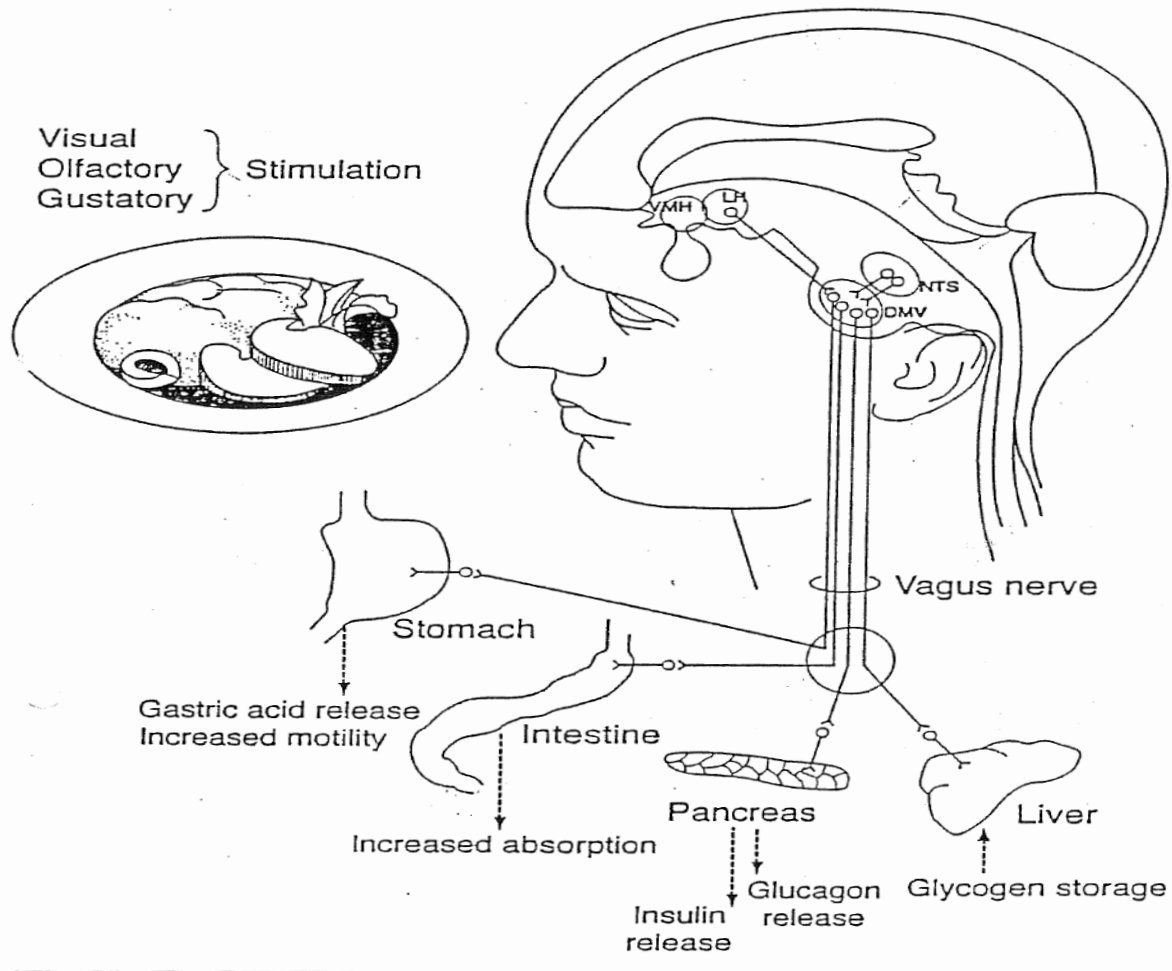
Biological behaviour develops during the individual ontogenesis. There are principal sets of reactions like reflexes, e.g. spitting.



**Components of biological behaviour** / Odum, E.P. Grundlagen der Ökologie; Thieme, Stuttgart, 1983

The interaction between food and body uses all human senses. There are pre-absorptive signals; seeing food, smelling and tasting; even thinking on food (suggestion) influences and modulates the sequences of physiological reactions

There is a myriad of factors which are supposed to control the food behaviour. The central organ for human information processing is the brain.



1  
relationships between the flavour of food and nutrient metabolism. Food-related sensory stimuli activate receptors in the head and neck region, which send a message to the brain. Within the brain, the nucleus

## **(Bb) Nutrition behaviour has a bio-psychological basis**

Already some decades ago one can find mechanisms and models, for the processes involved between perceptions of information until the responses to it. Modern neurobiology confirms and amends it.

Selection of bits from outside (S) through brain (O) and back to outside (R)

Stimuli flow –  $10^{11}$  bits/sec - Perception -  $3 \times 10^6$  bits/sec

Apperception – recognition of structures - decoding – understanding

About 160 bits/sec – short term memory –  
one or less bit – in long term memory

Signals for action



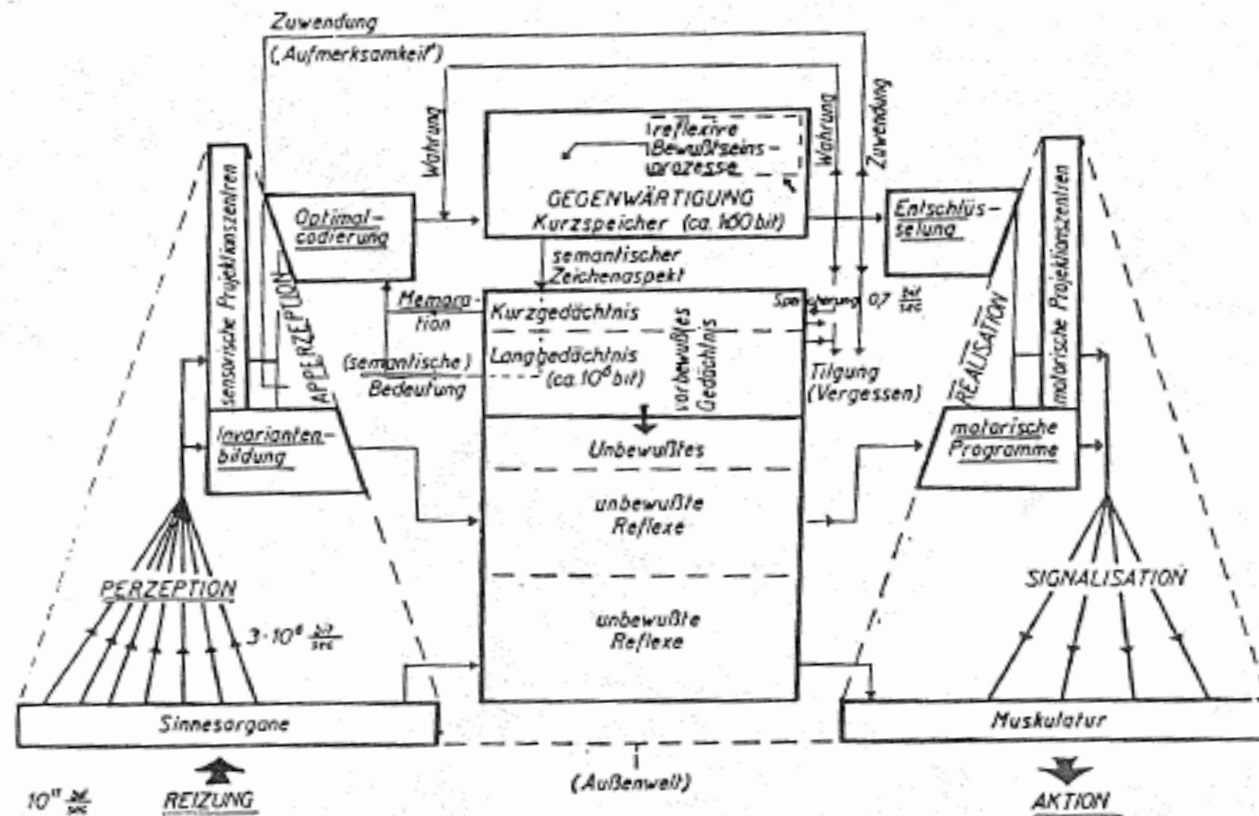


Abb. 17. Organogramm für den Informationswechsel beim Menschen.

(from: Tembrock, G.: Grundriss der Verhaltenswissenschaft. Grundbegriffe der modernen Biologie. G. Fischer, Stuttgart, NY, 1980)

Of 100 Mill. bit`s ca. 1 bit is absorbed and memorised consciously (perception).



The basic biological reactions (automatic and unconscious reactions; reflexes) are based in the limbic system (e.g. smell).

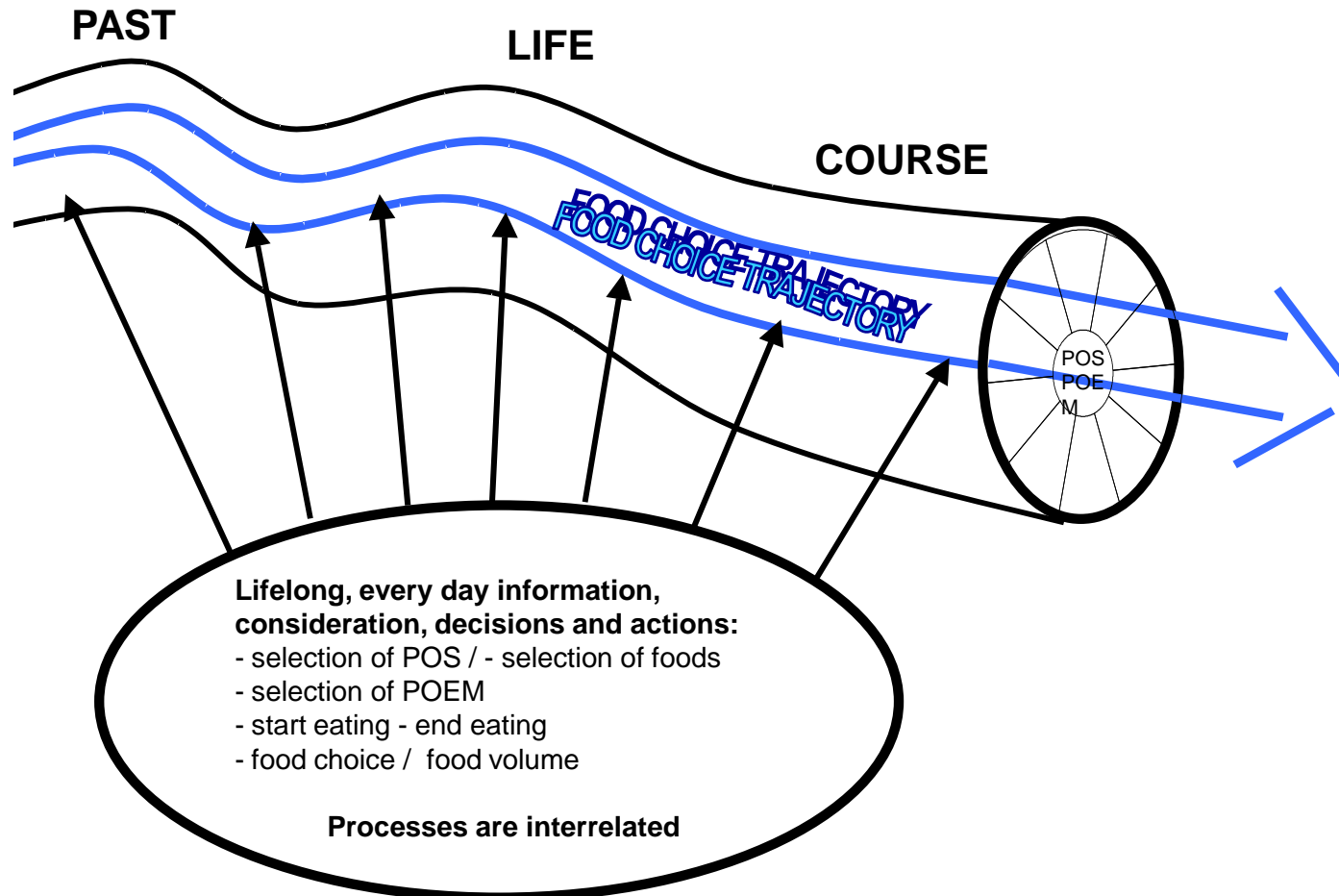
Feelings and emotions (e.g. likes and dislikes) and habitual actions (e.g. walking; eating) are controlled in the cerebellum and our rational thinking (problem solving) is based in the cerebral cortex. It is the door to our consciousness; it processes the input-information from different perception organs, like eye and ear, to cross-linked cognitions of entities which are stored in the memory

The brain regions are not isolated but there is a complex network. The development of the brain has a genetic base. The maturation is not a firm and deterministic process, but this is modulated by the environment; there is also nutrition programming of brain functions.

**The brain is not only a biological organ, but also a social organ.**

There is a continuously stream of interaction between environment and organism during the whole lifecycle

## A LIFE COURSE MODEL OF A FOOD CHOICE TRAJECTORY



In order to react properly, the information has to be categorized and patterned. The development of human behaviour is accompanied by setting up certain **structures (“gestalt”)**, these are needed for information processing: If we recognize certain characteristic parts, then a whole picture emerges in our brain; we construct the reality from our **“Gestalt-Library”**

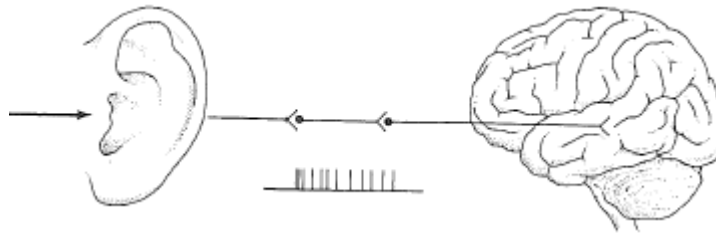
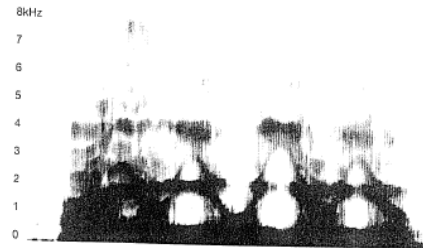
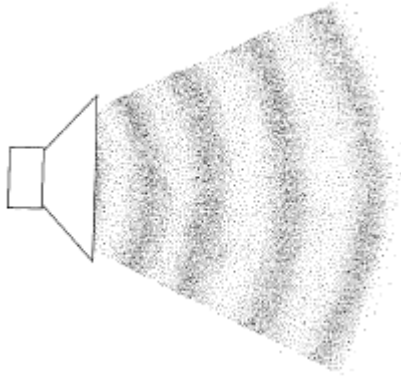
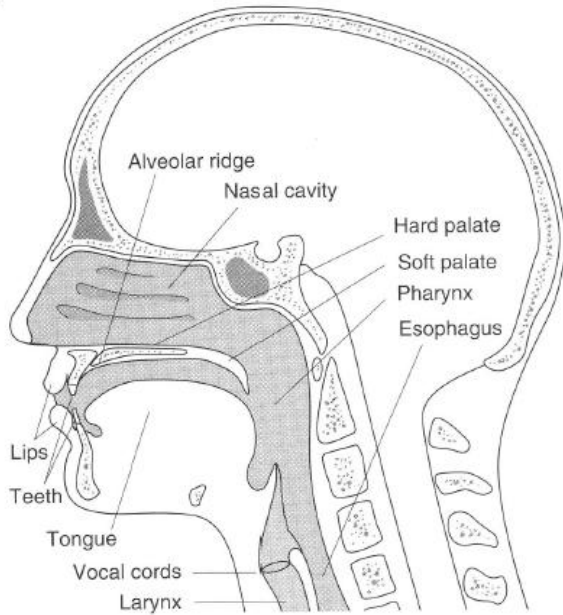


Emergence is demonstrated by the perception of the Dalmatian dog picture. Dog sniffing the ground in the shade of overhanging trees. The dog is not recognized by first identifying its parts, instead, the dog is perceived as a whole, all at once.

Such “Gestalts” are our psychological value systems (*MASLOW*) (e.g. *icons* (*Emoticons*) and non-verbal communication sign, which overt our mood.



Language is another example for it. Speaking is a process which transforms thoughts/information to mechanical activities (of mouth) and the tones are physical waves which trigger the ear and translated back to information. Only by coordinated patterned activity there is mutual understanding; otherwise it is simple a noise.



I owe you a  
yo-yo

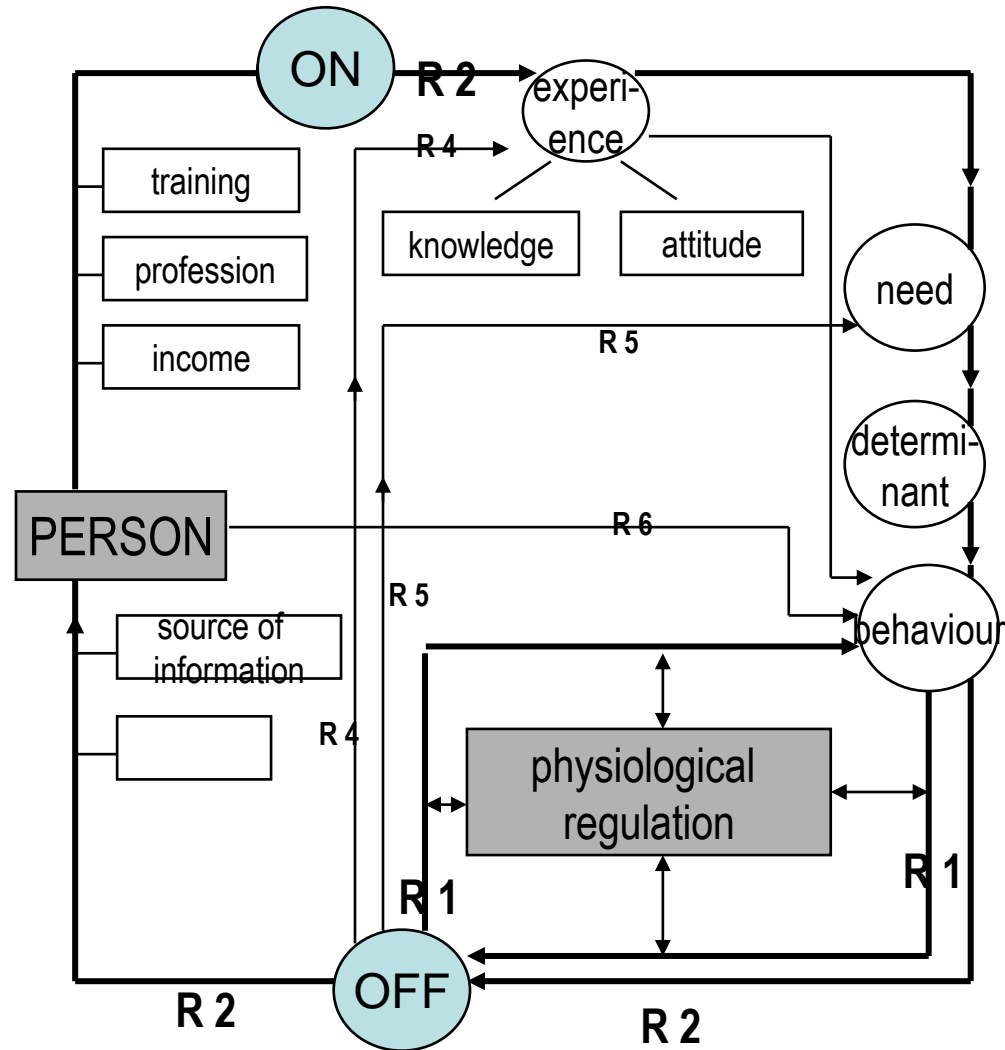
In a very similar way is eating a patterned activity (*Mary Douglas*) and a communication

Experiences with eating during the life course lead to structures which form our nutrition behaviour. The central construct for nutrition behaviour is the meal.

## **Point of Eating – The Meal (POEM)**

There are emotions (feeling, desire, belief, trust), motives (intention, interest, involvement) and attitudes. Food attitudes are mixtures of cognitive (knowledge), emotional and practical experiences (competences), around the foods, the eating, the meals.

These structures are acquired in the living processes. The internal rules are related to the environment, the social relations are modulating nutrition behaviour



EMSIG-MARS, 1983

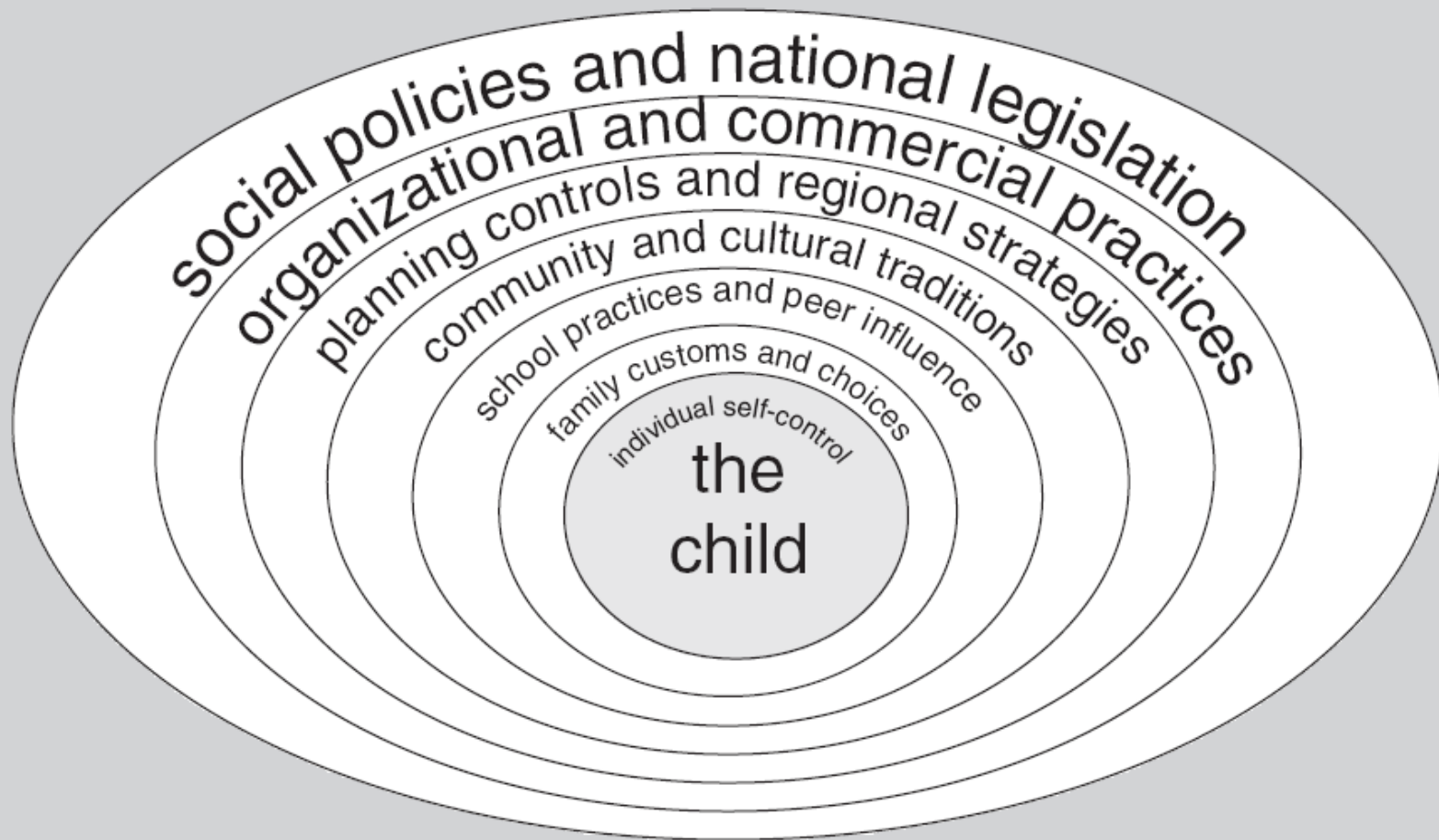


## **(Bc) Nutrition behaviour has a sociological basis**

Biopsychological reactions are confronted with social interactions. Human do not live autonomously.

**In human culture learning is important; a child has learnt to eat and to acquire a (basic) food and nutrition literacy.**

The social network follows given roles and rules; there are familial (micro level) rules; and families have to follow the rules of the neighbourhood;  
**micro-; meso- to macro-environment.**



One's behaviour is shaped by the circumstances - *Lobstein* -

During the civilizing process (*Norbert Elias*) we learned also to regulate and control our needs, feelings and affects. We can delay our eating, despite of strong hunger and appetite. In the family and in the region there are rules, for what to eat, when to eat and how to eat.

Man has to learn communication rules (verbal and non-verbal) (*Watzlawick*); learning the manners and the codes of conduct.

In the views of **anthropology**, human **ecology** and **ethnology** the availability of plants and animals are determining food behaviour.

The freedom of choice controlled by a balance between curiosity (*neophilia*) and caution and anxiety for the new (*neophobia*) leads to the food selection. Social and cultural processes are described by **cultural sciences**, like **history**. At the **macrolevel** rather strong societal laws exist; what can be eaten by whom (e.g. national dishes = cultural identity), and what is forbidden (e.g. food taboos).

There are the different social groups; each groups exerts different behaviours including nutrition behaviours (**nutrition sociology**). **Mesostructures** of the society (e.g. child vs. adult; rural vs. urban; lower vs. upper class etc), are related to nutrition behaviours. Eating manners are important for the communication and identity of the groups, and there are relations to spirituality and religion.  
“*Eating together bread*” (*con* – with; *panis* - bread *latin* = company).

The smallest units of the society (**microstructures**) are the **households** and the **families**, respectively. Traditionally one of the most important tasks of a household is providing enough safe food for all (**home economics**).

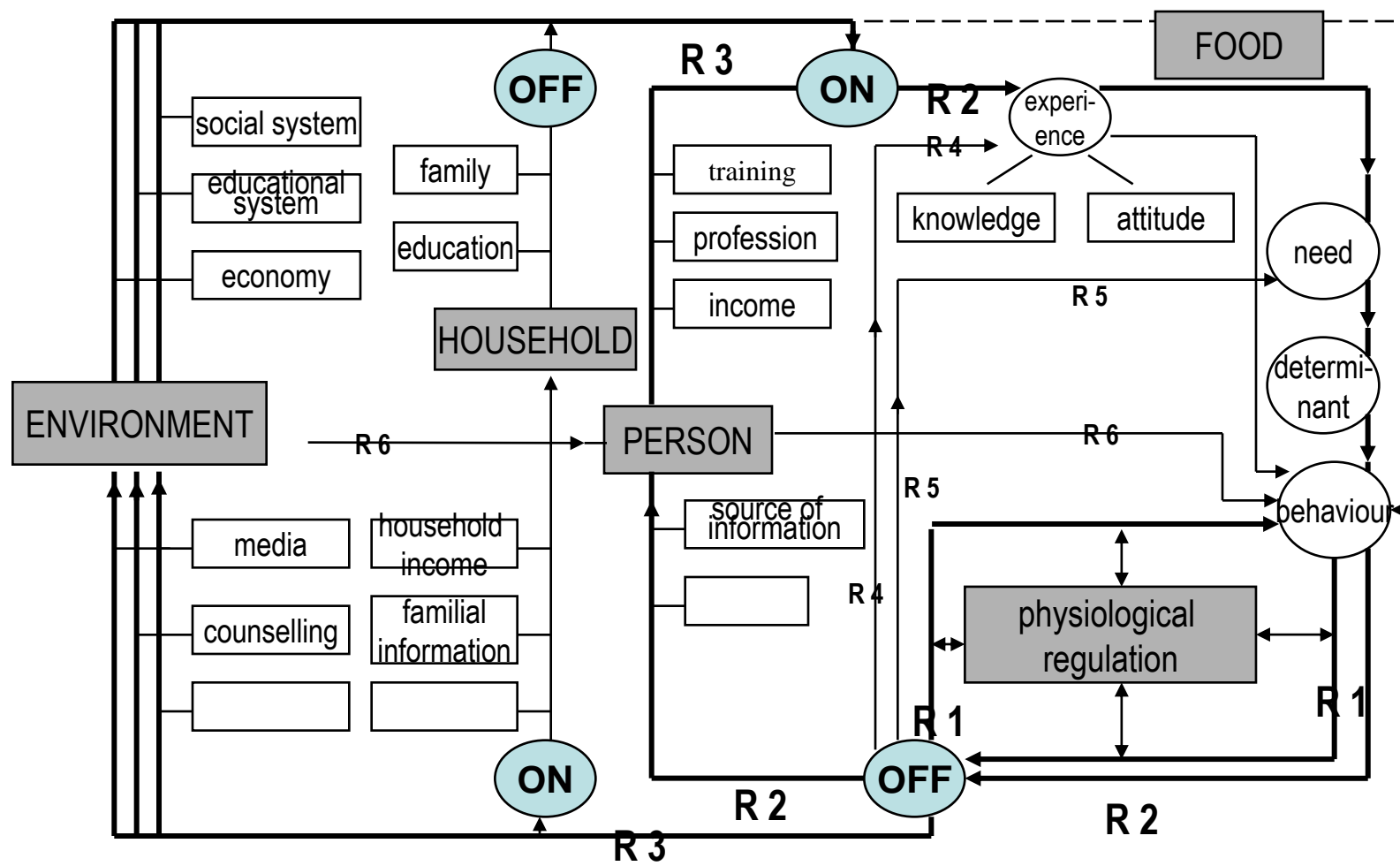
Influences of household on nutrition behaviour is overt; e.g. the economic and educational capacity; living conditions, health of the family members, their relationships within their families and their neighbourhood; their employment, and so on.

The income and the prices for food are important factors; therefore the **economical sciences** contribute to the determinants of nutrition behaviour.

Foods are acquired at the **point of sales (POS)**

**Marketing and communication/media research** is therefore highly relevant; in former time **agricultural/rural sociology** was important too.

All such factors can be summarised finally to **biopsychosociocultural** feed back loops (EMSIG-MARS, 1983)



This system is developed in the live stream starting in prenatal stages, and passes certain stages of development (e.g. stages according *Piaget* and *Eriksson*)

The adult should be literate and have the capability to fulfil all his needs (*Maslow*), and the society should support his behaviour by offering him the possibilities for this (*Ottawa Declaration*).

The complexity of the control system of nutrition behaviour is needed in order to stabilise and safeguard the fulfilment of food supply for the organisms.

In analogy to the biological homeostasis there is also an information homeostasis. (Nutrition) Behaviour has to be controlled and kept stable.



## **(C) Possibilities for Changing Behaviour by Application of Nutrition Behaviour Theory (Nutrition Communication Design)**

### **(C1) Behaviour changes are possible**

Homeostatic regulation does not mean stability (invariance); life signs are controlled changes.

Planned and directed changes are possible, if there are planned complex interventions. Analogies to the nutrition programs which lead via bioinformatics to personalised nutrition; we need to design a personalised nutrition communication.

Basic changes in behaviour are very difficult. Certain aspects are easier to change than others; very difficult to change are taste/sensoric preferences.

There are certain times in the life course, which are more sensitive for changes; e.g. during life events. There is a theory of latent, mobile phases of behaviour, versus stable phases.

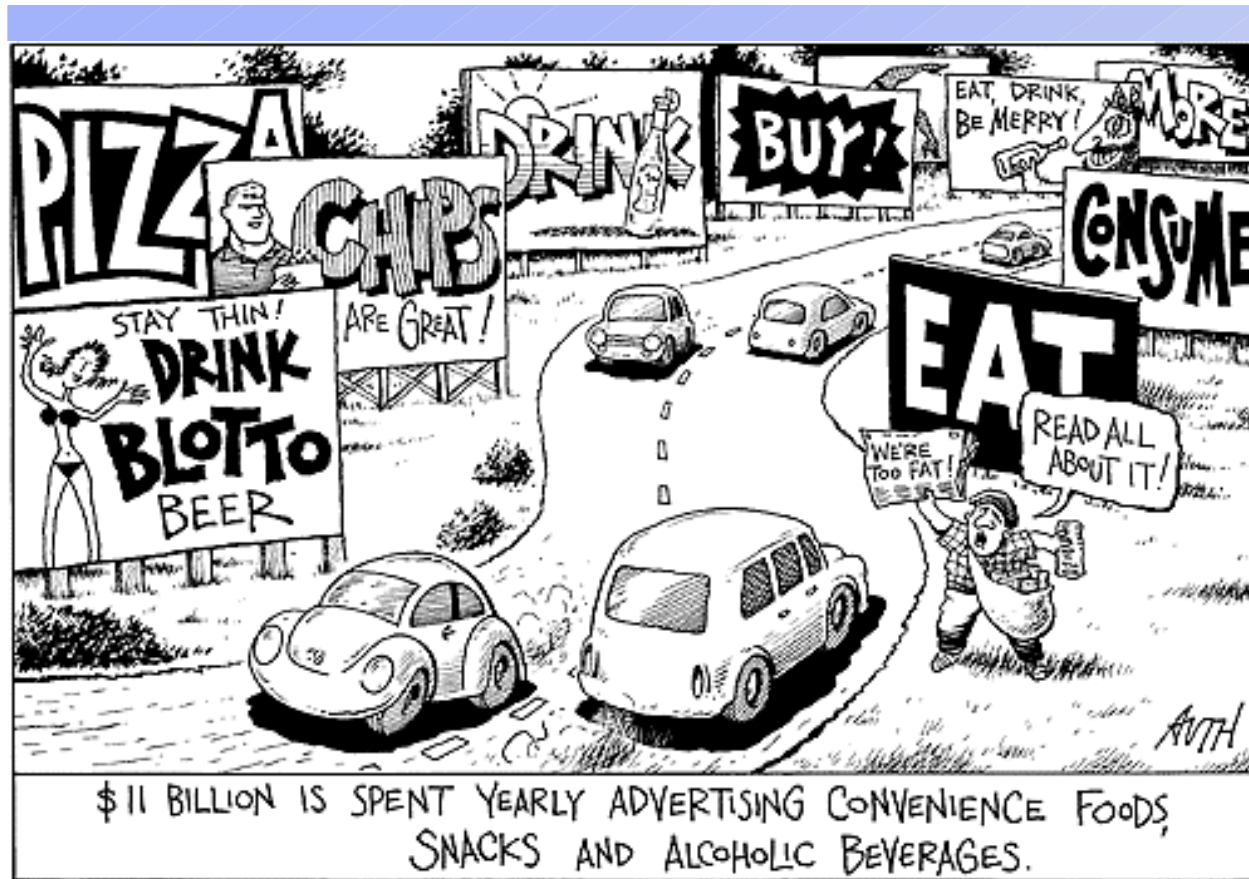
A homeostatic system is stable but not static; there are adaptations to new environments, and shifts in the set points. *Human adaptation has a huge capacity; e.g. humans are living everywhere on earth*

A recent quotation regarding food habit changes:

*“In my time before the soccer game we were eating ‘Schweinshaxe’ and nowadays the team gets ‘Müsli’.” (Franz Beckenbauer; 11<sup>th</sup> March 2007)*

There are huge efforts to change ...

The over information society gets daily about 3000 different advices from different sources how to behave



The aims of food marketing are “*eating every time, everywhere and in arm length*” and “*making the satisfied hungry*”, are successful.

## **(C2) Efficient Communication by Communication Design**

The prerequisite for communication is education. A well literate consumer is the model (“Leitbild”) of our society.

The basis for nutrition behaviour (as a basic life facility/literacy as speaking - communication, walking - mobility) is imprinted during infancy and childhood by all senses and by practice and training.

Nutrition related values are imprinted in the limbic system. Automatic unconsciously conducted every day actions are trained and imprinted in the cerebellum. Making such actions conscious they cannot be performed perfectly. New behaviours have to be trained in order to be practised automatically.

Lifelong learning requires **communication processes**. Information is transmitted from one person - *the sender* - to another one – the *receiver*. The model used in **communication theory** is related to S-O-R-models. It is part of our behaviour, and thus regulated in a biopsychosociocultural way.

Media for communication are different, e.g. speaking and eating. According to **Laswell** communication research has to find answers to the questions  
“**Who says** (sender) **what** (information) **in which channel** (media) **to whom** (receiver) **with what effect?**”

## Primary Sources of Nutrition Information – Scientific Community

- Public research – Universities; Research Centers,
- Private research – Industry;
- Non-Science Community

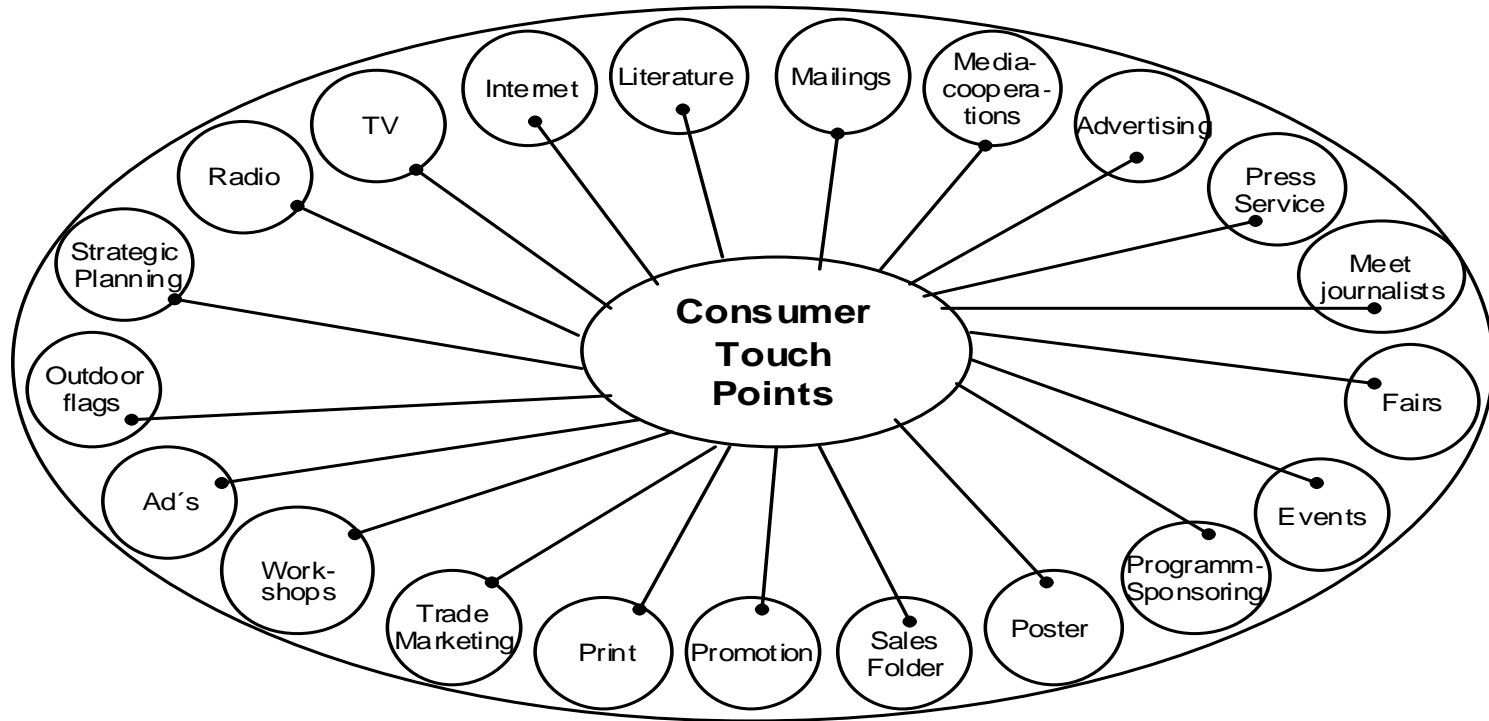
## Transformation and Communication Chain and System

- Press and media releases - by institutes, scientific organizations, food industry and trade;
- by governmental, public organization, consumer activists;
- by media and journalists

There are many senders for nutrition communication; they can be classified in very different ways. At micro level the family and household members, at meso level the friends, the neighbours, the colleagues on working place; the physicians, pharmacists; and at macro level – the mass media, information at point of sale, label on food packages; advertisements

# Holistic communication

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The AIDA formula expresses a simple form of the action chain of communication. The first target, the prerequisite for all communication is (attention; awareness): The signals of the senders have to be perceived.

**A** - Attention (awareness):

**I** - Interest:.

**D** - Desire:.

**A** - Action: (purchasing.)

New AIDA(**S**):

**S** - Satisfaction - satisfy the customer so they adhere



The audience - the receivers – the consumers –  
have to be differentiated in

## **information behaviour type of consumers**

according to media use (**media analyses**); according their  
proneness of acceptance for different media channels, their  
sensitiveness according the used communication channel (words,  
pictures, audio-visual; sensoric – sound design; smell; music, etc.);  
their selectiveness and awareness of the media, which is dependent  
on their value-structures; their “felt needs”, etc.

The different consumer-types (“receivers”) have to each of the  
sender a certain sets of **structured relationship** (non-user;  
frequency of usage; attitudes, image, trust, etc).

Table 5.3: National Rank-Orders of Truth-telling Institutional Actors. The ranking is based on the results in table 5.2.

Rank	Denmark	Norway	W. Germany	E. Germany	G.B.	Italy	Portugal
1	Cons. Org.	Cons. Org.	Cons. Org.	Cons. Org.	Cons. Org.	Cons. Org.	Cons. Org.
2	Food Experts	Food Experts	Food Experts	Food Experts	Food Experts	Food Experts	Food Experts
3	Media	Media	Food Auth.	Food Auth.	Food Auth.	Food Auth.	Media
4	Food Auth.	Food Auth.	Media	Media	Farmers	Media	Food Auth.
5	Sup. Chains	Farmers	Farmers	Farmers	Media	Sup. Chains	Farmers
6	Farmers	Sup. Chains	Sup. Chains	Sup. Chains	Sup. Chains	Farmers	Sup. Chains
7	Politicians	Politicians	Politicians	Politicians	Proces. Indust.	Proces. Indust.	Proces. Indust.
8	Proces. Indust.	Proces. Indust.	Proces. Indust.	Proces. Indust.	Politicians	Politicians	Politicians

<http://www.trustinfood.org/SEARCH/BASIS/tif0/all/wp/wp9.html>

The receiver pays different attention to the senders according the actual situation. In any case the higher the **quantity of input** of the senders the more likely it's the chance to have a first attention to the message.

Current example of record input by Toyota: The new model “AURIS” was in March 2007 for 10 days on 200.000 posters (with 27 different motives) (about 50% of all billboards in Germany); estimated cost: 30 millions €).

The attention differs according the **settings** in life – the actual **living situation** (behaviour settings). Regarding this conference especially information at POS is relevant, and here the attention of the consumer type differs according **type of food product**.

After first step (awareness) follows **interest**

The consumer (type) starts to select more information from its internal “library” and from the external arousal, becoming aware of an alternative to the “normal” decision.

In a quick **internal communication** process a array of information sets will be compared; emotional lead information, like appearance, fresh, coloured; personal experiences, preference structures; labels, brands; food price – special price, trust in producer and in trader; convenience factor; social and environmental consciousness; perceived health; etc. The consumer will bargain its own pro and cons of alternatives and then decide. The external messages (related to food quality and dietary goals) have to fit into the individual patterns of knowledge (understanding) and attitudes (interest; beliefs, trusts).

### *Benefit factors*

Well-being benefits

Weight and health benefits

Ethical benefits

Convenience and financial benefits

### *Barrier factors*

Personal barriers

Family and convenience barriers

Health barriers

'Junk' food, shopping, eating out and  
financial barriers

Information barriers

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Ref. Lea et al. EJCN 60 342 2006

Everyday the consumer (types) has in the flow of settings, to take routine decision. Their results are controlled subconsciously and consciously; there are warning signals if something is out of the norm, is against the expectation. In decisions to select foods at POS; there are many food attributes, which consumers have to trust.

**Trust** characteristic for food are **health claims**, eco label etc.

**Search** characteristics— e.g. price, appearance

**Experience** characteristics for food – e.g. taste, shelf-life; convenience

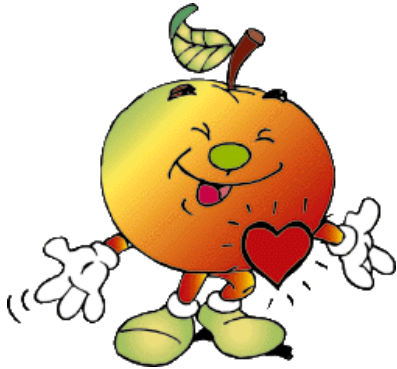
There is much different information. The trend in our society with increasing detailed knowledge; the number of consumer relevant information is increasing. Related to them are the messages from the nutrition societies and other groups; advice and rules for eating (food group based dietary and lifestyle related recommendations; e.g. eat five portions fruit a day; walk 1000 steps a day, etc)

The current consumer policy urges to increase consumer rights for the access to more information

Examples of information on food labels: Ingredients; nutrients - references; additives; alcohol; shelf life; health claim; ecolabel

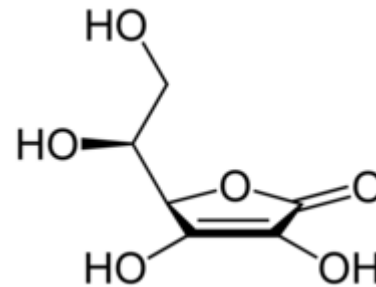
It is necessary to concentrate and **condensate** many **information** details to **simple “characters”**, like an **index**; it can be the label; **brand**; logo; icon; sign post ....

Necessary to investigate the **understanding** of it by the consumer type



Vitamin C

Ascorbic Acid

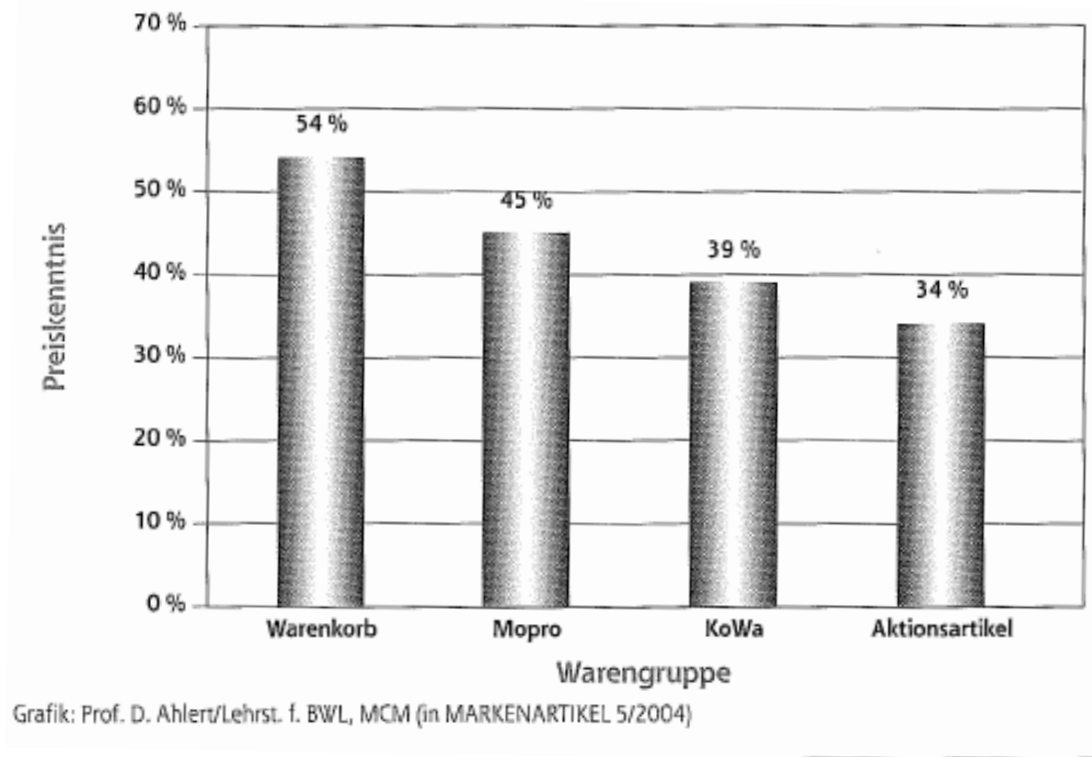


(*R*)-3,4-dihydroxy-5-((*S*)- 1,2-dihydroxyethyl)furan-2(5*H*)-one

IUPAC – Nomenclature



The experience show, even knowledge of simple things is not very good  
e.g. knowledge of actual prices: less then half of customers could tell the  
correct price (*actual vs felt price*)



During the step of gaining interest a further information cascade can start, and should be facilitated. To get information via other channels outside of POS; e.g. talking with friends and others about the topic. Labels and claims should become to an “IN” issue (a fashion)

The labels have to be transported into own's concepts; that they are part of the consumers own encyclopedia (*Gestalt Library*). The introduction of a new label (a new word) is only the initial step; it is comparatively easy to do.

*There are many new words introduced by our media and communication society (Wordspy – new words introduction).*

## Further steps of AIDA

**D - Desire:** convince customers that they want and desire the product or service and that it will satisfy their needs.

**A - Action:** lead customers towards taking action and/or purchasing.

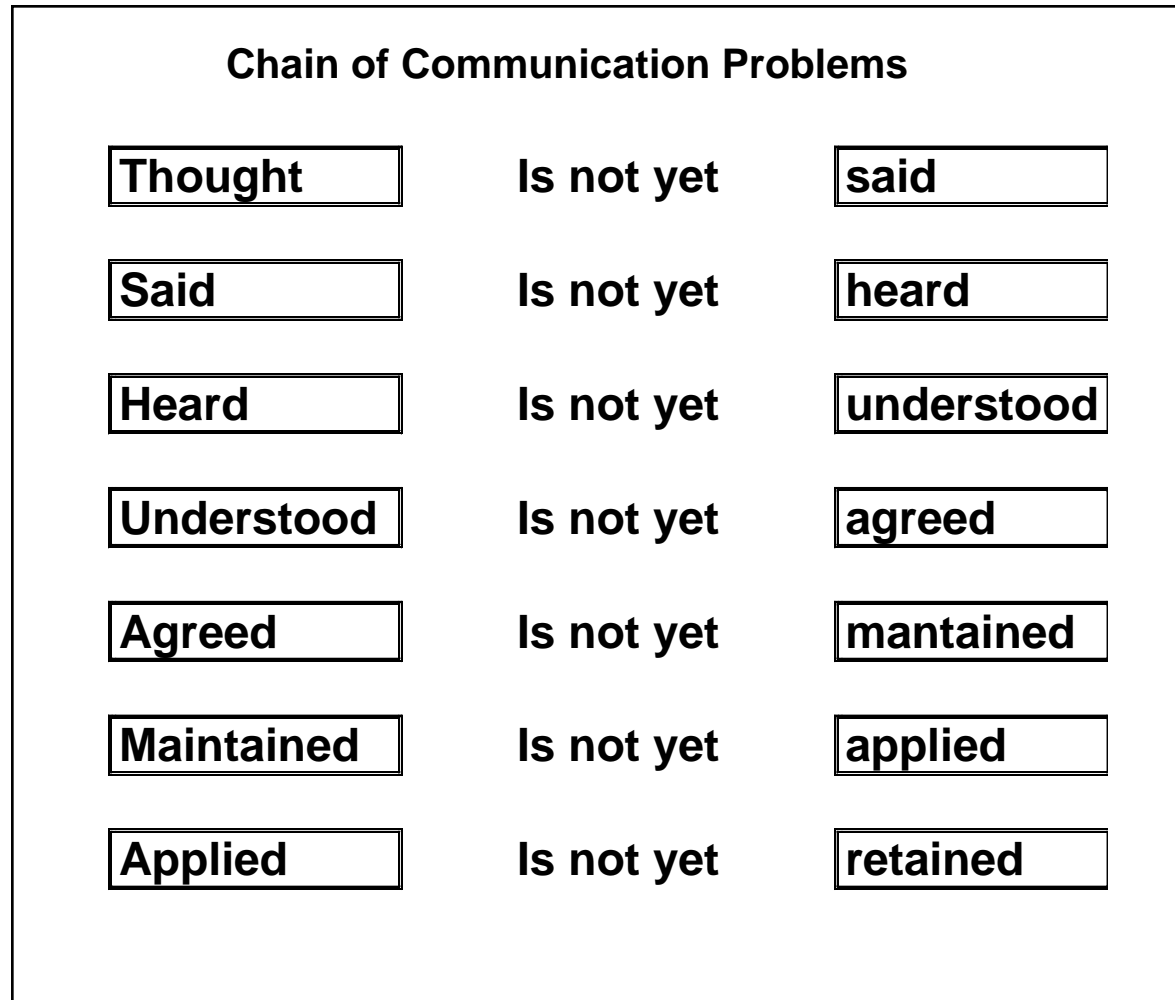
Nowadays some have added another letter to form AIDA(S):

**S – Satisfaction:** satisfy the customer so they become a repeat customer and give referrals to a product (fulfil the experience attributes).

The described internal information processing loops during the everyday experiences at POS and POEM are continuously working; the internal biopsychological loops are modulated by the socio-cultural influences. If the internal signals are coherent with the “triggered” expectations; and the individuals behaviour is supported by the society, then there is the chance to reach the dietary goal.

Like the general innovation diffusion processes; from first trial, to an acceptance and finally to the adherence of a new stable behaviour with a new level of behaviour set point is a long learning process.

There is a long chain of decisions and experiences to follow (*Lorenz-Steps*)



## (D) Conclusions – Final Remarks

A health claim is good, but only if it tells the truth; if it is recognised by many (social control).

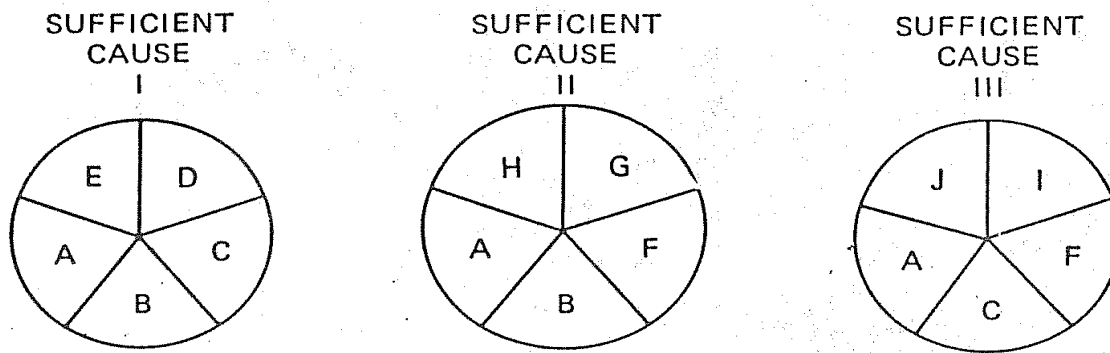
It is a precondition that the topic of the health claim becomes an issue. It cannot be used isolated; but only in context; there have to be relation to “social environment”. People are talking and discussing this subject.

They have to be supported by the society, this has to be an political issue. Only substantial information (agenda setting) (in quality and quantity) may alter the selection and reactions patterns.

Only in a long array of steps from attention to initial action (trying) and further on to adherence of the new food habit (learning processes) changing of food habits is possible, but to target it properly a concerted action is necessary. It is difficult to alter one´s opinion (prejudice).

# Isolated approaches to change the nutrition behaviour have only „isolated“ results

- Many single conditions have to interact in order to cause changes
- Analogies to the modern epidemiology-disease-causation-model of the „adequate causation-constellation“



*Fig. 2-1. Conceptual schematization of three sufficient causes for a disease [Rothman, 1976].*

(„only if all components of an electric installation are available and installed in a correct way then the light burns if you actuate the counter.“)

More research on complex model of nutrition behaviour is necessary; it sounds complex, but compared to bioinformatics it is rather simple. We have to study the consumer types; their “brain library” and the perception of external information. The intervention programs have to be designed; according to communication design, which has to be a part of designing of nutrition policy.

It is a kind of longitudinal research; analysing – deciding – monitoring (evaluation). The causes and intervention models have to fit the model of the special consumer and its special setting of live.

Finally it has to be reminded not to forget ethical issues regarding application of nutrition behaviour research. Those are questions of misuse of confidential information and for hidden manipulation of human behaviour.



**This is the end of my presentation**

**Thank you for your attention**