M.A.R.S. - MULTIPLE AUTOMATIC REGULATORY SYSTEM. A COMPREHENSIVE THEORETICAL APPROACH TO EMPIRICAL STUDIES OF NUTRITION BEHAVIOUR

A.A. Bodenstedt, U. Oltersdorf, A. Hendrichs and H. Böing

EXPLANATIONS TO THE POSTER:

In cooperation between the Institute of Rural Sociology and the Institute of Nutritional Sciences a hypothetical model was developed and underwent preliminary empirical testing during 1981. The model called MARS is formed of six interrelated feedback loops integrating the physiological mechanisms, attitude and knowledge, personal attributes, and environmental stimuli with special reference to the household, the natural and social structure. The overview of the model is presented on the first page of the poster.

The central part of the MARS model is the system ACTION (see part A). It contains, beside some other empirical indicator variables, mainly the food intake and habitual daily activities (motions) as an indicator for food energy/nutrient demand (requirement), as well as the results (output) of the balance between these two parts. It represents thus the physiological regulation. Empirically the food intake may be assessed by an introductory 24-h recall followed by a 7-day dietary record (weighing, household measurements, detailed descriptions of foods, recipes, situational aspects of eating). The daily habitual activities are assessed in a similar way: 24-h activity-recall and a 4-day activity record. The "output" (the health and nutritional status) is assessed by 10 anthropometric measurements (weight, height, frame, skinfolds) and by approximately 40 biochemical indicators measured in blood and 24-h urine samples.

The central physiological regulation loop is modulated by physio-psychological processes originating from the "black box" of motivation process (see part B). The main constructs of this loop, like preferences, attitudes, information, knowledge and mood, are assessed empirically by appropriate questionnaires or tests.

The personal regulation loops (loops No. 1-4) are further modulated by extrinsic parts, namely the household and the environment (see part C). These are also assessed empirically (questionnaire, observation, general survey).

The empirical testing of a complex model like MARS faces specific problems:
- the participation rate and the coping of people with the broad range of study instruments
- organizing of an interdisciplinary study team
- handling of the enormous amount (more than 1500 variables).

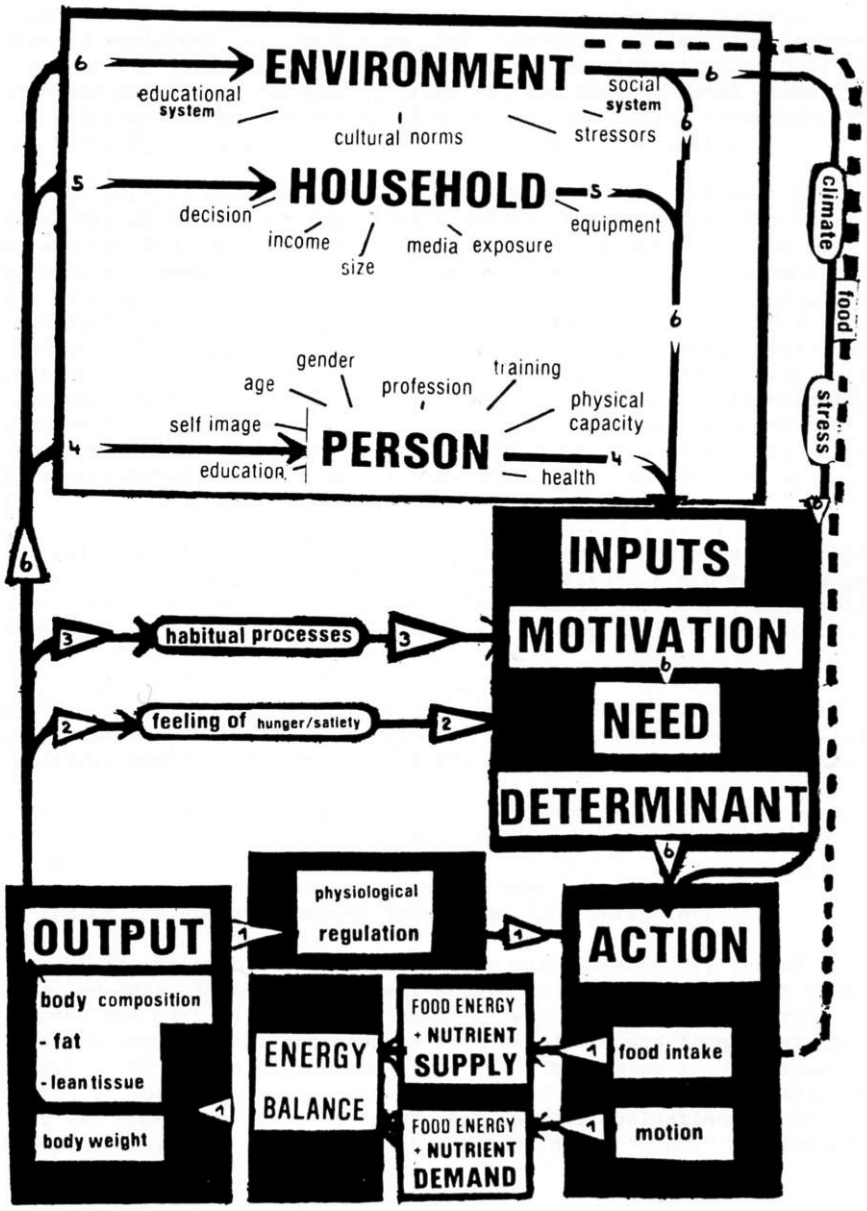
The feasibility of such an integrated study was successfully tested by á pilot study called EMSIG (Ernährungs-Modell-Studie in Giessen; nutrition model study in Giessen; see part D). The whole data set was assessed twice during 1981, simulating a longitudinal approach as is planned. It was found that people can be motivated for participation and a survey of this size is organizable. Data management is possible, too, since new software (programs) are available. The data set was stored by means of "SIR". For special evaluations we developed FORTRAN programs, e.g. for evaluation of food intake "GLANZ" (Giessener Liste

aller Nahrungsmittel und Zubereitungen; Giessen list of all foods and dishes) and for evaluation of daily habitual activities "GAST" (Giessener Auswertungsschema für Tätigkeitsprotokolle; Giessen evaluation scheme for activity diaries). Multivariate statistical techniques were used to evaluate complex hypotheses. Simulation of data models is possible.

Multiple Automatic Regulatory System

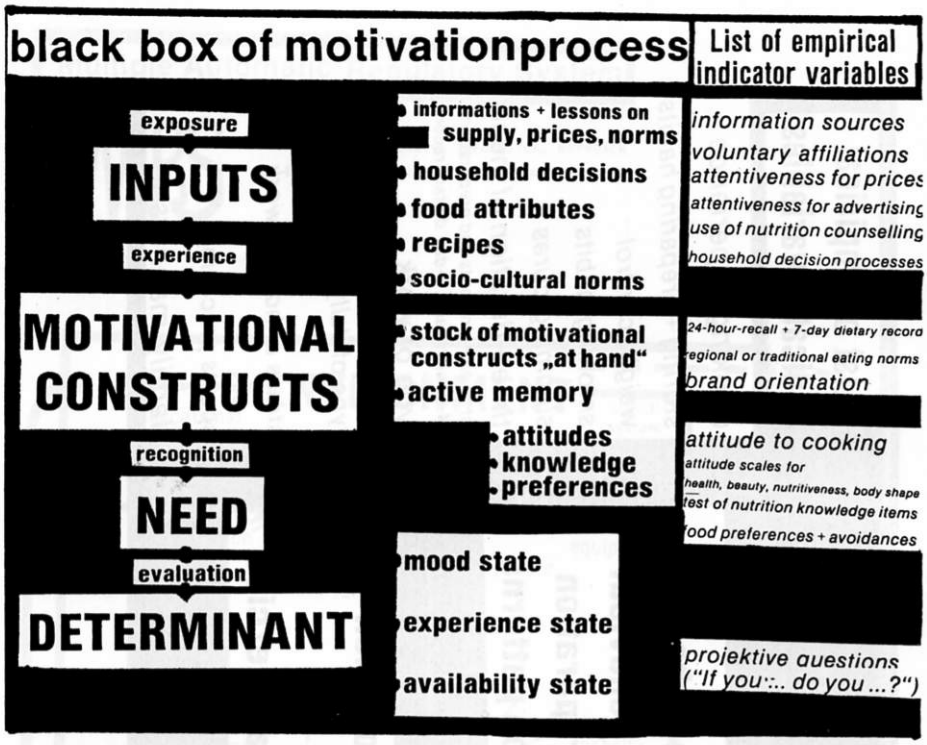
MARS

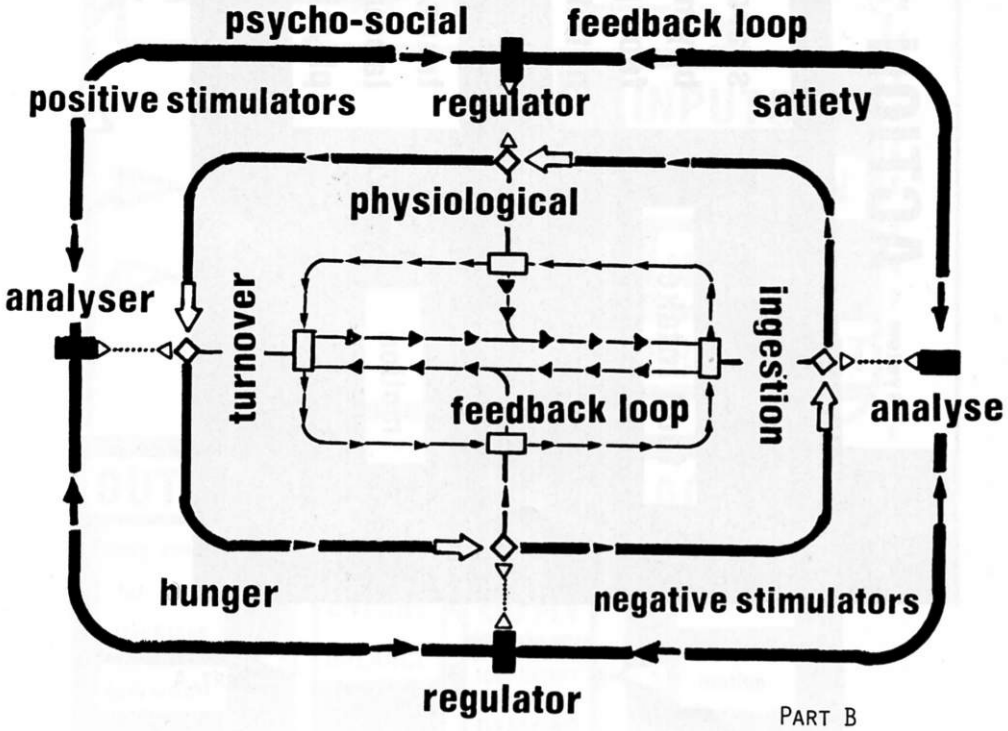
A COMPREHENSIVE THEORETICAL APPROACH
TO EMPIRICAL STUDIES OF NUTRITION BEHAVIOUR



system
ACTION
food intake
search + choice
buying behaviour
food preparation
nutrition patterns
motion
transportation
labour
physical exercise
List of empirical indicator variables
cooking experience
storing + preparing habits
weight control
smoking habits
slimming cures
time + duration of meals
list of all nutriments and preparations
24-hour-recall + 7-day dietary record
type of work
shopping frequencies
type of daily transportation
stress at home + work
sports practising
family manners

PART A


black box of motivationprocess
List of empirical indicator variables
exposure
INPUTS
experience
MOTIVATIONAL CONSTRUCTS
recognition
NEED
evaluation
DETERMINANT
informations + lessons on supply, prices, norms
household decisions
food attributes
recipes
socio-cultural norms
stock of motivational constructs „at hand"
active memory
attitudes
knowledge
preferences
mood state
experience state
availability state
information sources
voluntary affiliations
attentiveness for prices
attentiveness for advertising
use of nutrition counselling
household decision processes
24-hour-recall + 7-day dietary record
regional or traditional eating norms
brand orientation
attitude to cooking
attitude scales for
health, beauty, nutritiveness, body shape
test of nutrition knowledge items
food preferences + avoidances
projektive questions
("If you ... do you ...?")


psycho-social
feedback loop
positive stimulators
regulator
satiety
physiological
analyser
turnover
ingestion
feedback loop
analyse
hunger
negative stimulators
regulator

PART B

	List of empirical indicator variables
ENVIRONMENT	
climate, weather	
environmental stressors	*daily transportation*
class attributes	*affiliations*
media + advertising	*nutrition counselling available*
education + training systems	*stress felt at home*
socio-cultural norms + fashions	*stress felt at work*
gastronomy	
HOUSEHOLD	
household budget	*household size + composition*
family type	*income*
family history (parents, brothers)	*current expenditures*
family educational style	*vacational budget + activities*
household technical equipment	*flat size*
	furniture standard
	kitchen equipment
	storing facilities
PERSON	
age / gender / race	*age, gender*
self concept	*weight, height, skinfolds*
health state	*body measures*
humour	*medical + selfanalysis of*
personal information habits	*health state, sleep, accidents*
professional situation	*tests on nervousness, agressiveness, depressiveness, lability, extra- or introversion, concentration a. o.*
physical capacity	

MARS

-consists of 6 hypothetical feed back loops

-contains physiological, psychological + social processes influencing (or being influenced by) FOOD INTAKE

-Provides for different model types

EMSIG

Ernährungs-Modell-Studie in GIESSEN Nutrition Model Study in GIESSEN

-one year / two phases (may + october 1981)

-112 test persons, sampled by public call for volunteers
call at university
area sampling

-survey of nutrition behaviour, physical activity, psychic, social + biological variables

Aim

testing all survey instruments that might be usable in a longitudinal panel study on determinants of nutrition behaviour

Methods

-24 hour recall on food intake

-7 day record on food intake

-3 day record on daily activities

-questionnaires on household, living, work, education, buying + consumption attitudes + behaviour

-tests on personality variables

-antropometric measures

-clinical examiniation

-biochemical analyses of blood + urine samples

Results

biological parameters + behaviour patterns are consistent even if surveyed at different times

semi-quantitative measuring and social science survey methods can be integrated into research approach

biochemical patterns are similar to those found elsewhere

EURO-NUT. A Concerted Action Project on Nutrition in the European Community (1982-1986).
Project Management Group:
Prof. J. G. A. J. Hautvast, Wageningen, The Netherlands (Project Leader); Dr G. G. de Backer, Ghent, Belgium; Dr A. E. Baert, Brussels, Belgium (CEC); Mr P. Ducimetière, Paris, France; Prof. J. V. G. A. Durnin, Glasgow, UK; Dr S. Ghione, Pisa, Italy; Dr A. Green, Odense, Denmark; Prof. J. Kevany, Dublin, Ireland; Prof. C. Leitzmann, Giessen, West-Germany; Dr V. Thévenin, Brussels, Belgium (CEC); Prof A. Trichopoulou, Athens, Greece.

CIP-gegevens Koninklijke Bibliotheek, Den Haag

Measurement

Measurement and determinants of foods habits and food preferences: report of an EC workshop, Giessen, West-Germany 1-4 May 1985/ed. by Joerg M. Diehl and Claus Leitzmann; [participants A. Bodenstedt... et al.]. – [Wageningen: Stichting Nederlands Instituut voor de Voeding (distr.)]. – Ill. – (Euro-Nut report; 7).
Euro-Nut: a concerted action project on nutrition in the European Community.
ISBN 90-70840-12-X
SISO 628.6 UDC 613.2
Trefw.: voedingsgewoonten.

ISBN

**Prof. Dr J. G. A. J. Hautvast, Department of Human Nutrition,
Agricultural University, De Dreijen 12, 6703 BC Wageningen,
The Netherlands.
Telephone (08370) 82589/82590
Telex: 45888 intas**

Measurement and determinants of food habits and food preferences

Report of an EC Workshop, Giessen, West-Germany
1-4 May 1985

Edited by
Joerg M. Diehl and Claus Leitzmann
Institute of Nutrition, Justus-Liebig University,
Giessen, West-Germany

EURO
NUT

A concerted action project on nutrition in the European Community