

# Curriculum vitae, Per Møller PhD

## Education

Year: 1987, Cand. Scient, physics and mathematics, Niels Bohr Institute, University of Copenhagen, Denmark.

Year: 1991, MA, Psychology, Department of Brain and Cognitive Science, University of Rochester, NY, USA.

Year: 1992, PhD, Cognitive Science, Department of Brain and Cognitive Science, University of Rochester, NY, USA.

## Employments

1987- 1992: Research assistant, teaching assistant, PhD student, Department of Brain and Cognitive Science, University of Rochester, NY, USA.

1993-1999: Research Associate, Department of Physiological Sciences, Medical School, University of Newcastle, UK

1999-1/10/2016: Associate Professor, Food Design and Consumer Behaviour, Department of Food Science, University of Copenhagen, Denmark

1/10/2016 - : Senior Scientist (part-time), Food Design and Consumer Behaviour, Department of Food Science, University of Copenhagen, Denmark.

2011- : private consultant

2012- : Editor-in-chief (with Peter Barham) of the scientific journal Flavour

## Professional resume and scientific competences

My scientific work started out in theoretical physics. This work led to a strong interest in visual perception after having developed a model of early vision in layer IVc of the macaque. In 1987 I moved to the US to obtain a PhD in visual cognition. Until 1999 I worked on various problems in vision, eye movements and spatial memory. Upon my return to Denmark in 1999 I took up studies of the chemical senses, smell, taste and chemesthesis, as well as work on (food) preference formation, choice behavior and eating behavior in general. Comparative studies in collaboration

with colleagues abroad have led us to formulate a new theory of 'conscious olfaction', which can explain more olfactory phenomena than other available theories. At the same time I have been involved in a large number of (food) preference formation experiments on children. This work has led to a number of scientific insights as well as to the development of new methods and tools that can be applied scientifically and in industry. Also, our results lend themselves to implementation in schools, institutions, hospitals and other places where it is desirable that people change their food habits. Other work in food (choice) behavior falls within the field of nudging and neurogastronomy and gastrophysics. Recently, I have started collaborations with neuroscience colleagues on problems of neural plasticity of the senses.

My work has been concentrated on problems of eating behavior, sensory and consumer science, perception, psychophysics, eye movements, memory, decision making and cognitive neuroscience.

I have published papers in sensory science and nutrition, cognitive psychology, cognitive neuroscience, psychophysics, neurophysiology and physics.

I have an extensive international network of collaborators. Projects with colleagues from Sweden, The Netherlands, France, England, Greece, Portugal, USA and Denmark.

My research work has received funding from the Wellcome trust (UK), Carlsberg foundation (DK), research councils in Denmark, EU research projects and private funding from companies in Denmark and abroad.

### **Research interests**

Sensory perception and its neurophysiological underpinnings; Psychophysics and neurophysiology of memory; Cognitive and affective neuroscience; Relationships between body and brain; Psychophysics and physiology of eating behaviour; Sensory Science and its relations to nutrition; Implicit cognition and choice behaviour; Preferences, habits and addictions, behavioral economics, consumer behavior and nudging, neural plasticity.

### **Teaching experience**

I have taught physics (University of Copenhagen), psychology and psychophysics (University of Rochester, USA; University of Newcastle, UK; Durham University, UK; University of Copenhagen), sensory science (University of Copenhagen), food choice behavior and neurophysiology (University of Copenhagen).

I have developed courses at the University of Copenhagen and lectured in a number of courses at that university. Until recently I was course responsible for the master-course Food Choice and Acceptance taught at the Institute of Food Science, University of Copenhagen.

I have supervised a large number of students on all levels (from BSc to PhD) at the University of Newcastle, England and at the University of Copenhagen, Denmark.

I have also taught in courses at the “Mediehøjskolen”, Copenhagen, Denmark, University of Ålborg, Denmark, at a number of hospitals and municipalities in Denmark and at courses in Meyers Madhus, Copenhagen Denmark.

### **Editorial and reviewing experience**

I am co-editor-in-chief of the scientific journal *Flavour* and review scientific papers for the journals: Appetite, Food Quality and Preference, Journal of Sensory Studies, Chemical Senses, Flavour, Chemosensory Perception, Physiology and Behavior, Neuroscience methods, Psychophysiology, PlosOne, Frontiers in Psychology, Nature, Current Biology, Journal of the Neurological Sciences, British Journal of Nutrition and Perception&Psychophysics.

### **Managerial experience**

I have managerial experience from several national and international research projects, e.g.:

- The role of visual and odour memory in the food preferences of young and old people (financed by Symrise), 2002-2004.
- Nutritious meals with high sensory quality: sensory science, nutrition, physiology (financed by Fødevareteknologi, -sikkerhed og -kvalitet), 2003-2006.
- Kød som en del af et måltid (financed by Fødevare-Erhverv), 2004-2007.
- Step-by-step change of children’s preferences toward healthier foods (financed by FØSU), 2007-2011.
- Determining factors and critical periods in food habit formation and breaking in early childhood: a multidisciplinary approach (financed by EU), 2010-2014.

### **Dissemination of work**

My work is disseminated in various ways:

Popular media: I have participated in many TV- and radio programs and have been interviewed in many journals and newspapers in Denmark and abroad. Since the year 2000, I have been interviewed or participated in programs more than 200 times.

Scientific conferences: More than 100 oral presentations and posters since the year 2000. I have been an invited speaker at Universities and other scientific institutions in the US, England,

Germany, the Netherlands, Austria, The Czech Republic, France, Italy, Greece, Finland, Norway and Denmark.

ResearchGate: Per Møller

## Scientific Publications, Per Møller

- Møller P, Nylen M, Hertz JA. (1988) A Cortical Network Model for Early Vision Processing. In: Eckmiller R, Malsburg C von der (eds), Neural Computers, NATO ASI Series F: Computer and Systems Sciences, Vol. 41, Springer-Verlag, Berlin Heidelberg, pp. 139-148.
- Hayhoe MM, Lachter J, Møller P. (1992). Spatial Memory and Integration Across Saccadic Eye Movements. In: Rayner K (ed), Eye Movements and Visual Cognition: Scene Perception and Reading, Springer Series in Neuropsychology, New York, pp. 130-145, 1992.
- Karn KS, Møller P, Hayhoe MM. (1993). Precision of the eye position signal. In: Van Rensbergen J, d'Ydewalle G (eds), Perception and Cognition: Advances in Eye Movement Research, Vol.4, Studies in Visual Information Processing. Elsevier Science, Amsterdam, pp. 71-82.
- Karn KS, Lachter J, Møller P, Hayhoe MM. (1994) Task dependent spatial memory across saccades. Behavioral and Brain Sciences, 17:2, 267-268.
- Møller P, Hurlbert AC (1996). Psychophysical evidence for fast region-based segmentation processes in motion and color. Proc Natl Acad Sci USA, 93, 7421-7426.
- Møller P, Hurlbert AC. (1997.) Interactions between colour and motion in image segmentation. Current Biology, 7, 105-111.
- Møller P, Hurlbert AC. (1997). Motion edges and regions guide image segmentation by colour. Proc R Soc Lond [Biol] 264, 1571- 1577.
- Karn KS, Møller P, Hayhoe MM. (1997). Reference frames in saccadic targeting. Exp Brain Res, 115, 267-282.
- Green, G.G.R., Ioannides, A.A., Bramwell, D., Griffiths, T.D., Rees, A., Witton, C., Hurlbert, A.C., Bamidis, P.D., Møller, P., Boers, F., Dammers, J., Müller-Gartner, H.W. (1997). The use of magnetoencephalography to investigate the cortical response to sounds that appear to move. Journal of Audiology, 31, 91-92(4).
- Martens M., Bredie W., Dijksterhuis G., Martens H., Köster E.P., Møller P. (2000), Human Senses in Action, pp. 73-79. In Bonnet, C. (Ed.) (2000) Fechner Day 2000. Proceedings of the Sixteenth Annual Meeting of the International Society for Psychophysics, Strasbourg, France: The International Society for Psychophysics.

- Kjøbæk N, Friis A., Rugholt S., Møller P., Adler-Nissen J. (2001). Validation of a Texture Simulator. Annual Transactions of the Nordic Rheology Society, vol. 8/9, 2000/2001, pp. 101-104.
- Bredie W., Ivanova D., Møller P., Petersen M. (2001). Apple or mushroom – sensory impact of 1-octen-3-one in an apple odour mixture. Food processing Industry Magazine, pp. 5-7, issue 10.
- Dijksterhuis G., Møller P., Bredie W., Rasmussen G., Martens M. (2002). Gender and Handedness effects on hedonicity of laterally presented odours. Brain and Cognition 50, 272-281.
- Petersen MA, Ivanova D, Møller P & Bredie WLP (2003). Validity of ranking criteria in gas chromatography - olfactometry methods. In Flavour Research at the Dawn of the Twenty-first Century. Proceedings of the 10'th Weurman Flavour Research Symposium. Eds. J.L. Le Quere & P.X. Etievant. Intercept Publishers, 494-499.
- Sørensen L., Møller P., Flint A., Martens M., Raben A. (2003). Effect of sensory perception of foods on appetite and food intake: a review of studies on humans. Int. J Obesity 27, 1152-1166.
- Møller P and Dijksterhuis G (2003). Differential human electrodermal responses to odours. Neurosci. Letters, 346, 129-132.
- Møller P, Wulff C, Köster E.P.(2004). Do age differences in odour memory depend on differences in verbal memory? Neuroreport. 15(5):915-917.
- Møller P, Meyer C., Pedersen T., Martens M. (2005), bookchapter: Smagens fysiologi, in Menneskets ernæring, Munksgaard Danmark, 423-431.
- Wolkoff P, Damgård Nielsen G, Møller P, Nielsen P.A.(2006). Vurdering af VOC'er i indemiljøluften II: Lugtkvalitetens betydning. Miljø og Sundhed, 30, 3-12.
- Dijksterhuis G, Mojet J, Köster E, Møller P, Hausner H, Issanchou S, Sulmont-Rossé C., Zandstra E (2006): The role of memory in food choice and liking. Food Quality and Preference 17, 650-657.
- Møller P., Hausner H. (2006): Memory of sweetness and fatty flavours: Effects of gender and liking. Food Qual Pref 17, 653-654.
- Møller P., Mojet J, Köster, E.P (2007). Incidental and intentional flavour memory in young and older subjects., Chem. Senses 32: 557–567.

- Reinbach H.C., Meinert L., Ballabio D, Aaslyng M.D., Bredie W.L.P., Olsen K., Møller P (2007). Interactions between oral burn, meat flavor and texture in chili spiced pork patties evaluated by time-intensity. *Food Qual Pref* 18, 909-919.
- Hausner H., Bredie WLP., Mølgård C, Pedersen M.A., Møller P.(2008) Differential transfer of dietary flavour compounds into human breast milk. *Physiol Behav.*95, 118-124.
- Reinbach H., Toft M, Møller P. (2008). Relationship between oral burn and temperature in chili spiced pork patties evaluated by time-intensity. *Food Qual Pref*, 20, 42-49.
- Sulmont C., Møller P., Issanchou S, Köster E.P. (2008) Effect of age and food novelty on food memory. *Chem. Percept.* 1, 199-209.
- Bitnes J., Ueland Ø, Møller P., Martens M. (2008). Reliability of sensory assessors: issues of retention and learning. *J Sens Studies.* 23, 852–870.
- Bitnes J., Ueland Ø, Møller P., Martens M. (2009). Reliability of sensory assessors: issues of complexity. *J Sens Studies.* 24 (2009) 25–40.
- Reifelt H.H., Gabrielsen G., Bjerre M., Aaslyng M, Møller P (2009). Consumer preferences for visually presented meals. *J Sens Studies.* 24, 182–203.
- Reinbach H.C., Smeets A., Martinussen T., Møller P., Westerterp-Plantenga M.S.(2009). Effects of capsaicin, green tea and CH-19 sweet pepper on appetite and energy intake in humans in negative and positive energy balance. *Clinical Nutrition* 28, 260-265.
- Hausner H. , Nicklaus S., Issanchou S, Mølgård C., Møller P (2010). Breastfeeding facilitates acceptance of a novel dietary flavour compound. *Clinical Nutrition* 29, 141–148
- Barham P, Skibsted L, Bredie W, Bom Frøst M, Mølle P, Risbo J, Snitkjær P, Mørch Mortensen L. (2010)Molecular Gastronomy: a new emerging scientific discipline. *Chem. Rev.*, 110, 2313–2365.
- Reinbach H, Martinussen T, Møller P (2010). Effects of hot spices on energy intake, appetite and sensory specific desires in humans. *Food Quality and Preference* 21, 655–66.
- Møller P, Martens M, Meyer C, Bredie W (2010), book chapter: Smagens fysiologi, in *Menneskets Ernæring*, Munksgaard Danmark, 255-263.
- Jönsson F, Møller P, Olsson M (2011). Olfactory working memory: Effects of verbalization on the 2-back task. *Mem Cogn*, 39:1023–1032

- Olsen A, Ritz C, Hartvig D, Møller P (2011) Comparison of sensory specific satiety and sensory specific desires to eat in children and adults. *Appetite* 57, 6–13.
- Kildegaard H, Olsen A, Gabrielsen G, Møller P, Thybo A (2011). A method to measure the effect of food appearance factors on children's visual preferences. *Food Quality and Preference* 22, 763–771.
- Bredie W, Møller P (2012). Sensory Perception – an overview. Ch1 in *Alcoholic beverages*, ed. John Piggott, Woodhead Publishing Series in Food Science, Technology and Nutrition: Number 225, 3-23.
- Olsen A, Ritz C, Kraaij L, Møller P (2012). Children's liking and intake of vegetables: A school-based intervention study. *Food Quality and Preference*, 23, 90–98.
- Morin-Audebrand L, Mojet J, Chabanet C, Issanchou S, Møller P, Köster E.P, Sulmont-Rossé C. (2012). The role of novelty detection in food memory. *Acta Psychologica*, 139, 233-238.
- Møller P, Köster E.P (2012). Variety and overeating: comments on long term habituation to food. Letter to the editor. *Am. J Clin. Nutr.* vol. 95 no. 4, 981
- Barham P J, Møller P. Welcome to *Flavour*. Editorial in *Flavour* 2012, 1:1
- Møller P, Köster E.P. , Dijkman N, de Wijk R, Mojet J (2012). Same-different reactions times to odours: some unexpected findings. *Chem. Percept.* 5:158–171.
- Hausner H, Olsen A, Møller P (2012). Mere exposure and flavour-flavour learning increase 2–3 year-old children's acceptance of a novel vegetable. *Appetite* 58, 1152–1159
- Olsen A, Ritz C, Kramer L, Møller P (2012). Serving styles of raw snack vegetables. What do children want? *Appetite* 59, 556–562.
- Olsen A, Kildegaard H, Gabrielsen G, Thybo A K, Møller P (2012). Measuring children's food preferences: using pictures in a computerized conjoint analysis. *Journal of Sensory Studies* 27, 264–276
- Møller P (2013). Gastrophysics in the brain and body. *Flavour* 2:8
- Olsen A, Møller P, Hausner H (2013). Early origins of overeating: Early habit formation and implications for obesity in later life. *Curr Obes Rep.* DOI 10.1007/s13679-012-0046-3
- Viemose I, Møller P, Laugesen J, Schachtman T, Manoharan T, Christoffersen G (2013). Appetitive longterm taste conditioning enhances human visually evoked EEG responses. *Behavioural Brain Research* 253, 1– 8.



- Ahern S, Caton S, Bouhlal S, Hausner H, Olsen A, Nicklaus S, Møller P, Hetherington M (2013). Eating a Rainbow. Introducing vegetables in the first years of life in 3 European countries. *Appetite* 71, 48–56
- Møller P (2014). Orosensory Perception. Chapter in *Pediatric Formulations – Mapping the Road*. Springer Verlag.
- Bech Andersen S, Holst KK, McMahon B, Madsen MK, Møller P, Hageman I, Knudsen G (2014). Sweet taste sensitivity is influenced by 5-HTTLPR genotype and affected in seasonal affective disorder. *Psychiatry Research* 220, 727–729.
- Köster EP, Møller P, Mojet J (2014). A “Misfit” Theory of Spontaneous Conscious Odor Perception (MITSCOP): reflections on the role and function of odor memory in everyday life. *Front. Psychol.*, doi: 10.3389/fpsyg.2014.00064.
- Caton S, Blundell P, Ahern S, Nekitsing C, Olsen A, Møller P, Hausner H, Remy E, Nicklaus S, Chabanet C, Issanchou S, Hetherington M (2014). Learning to Eat Vegetables in Early Life: The Role of Timing, Age and Individual Eating Traits. *PLoS One* 2014 DOI: 10.1371/journal.pone.0097609
- Bredie W, Meyer C, Møller P, (2015), book chapter: Smagens fysiologi, in *Menneskets Ernæring*, Munksgaard Danmark, 275-284.
- Møller P. Taste and Appetite (2015). *Flavour*, <http://www.flavourjournal.com/content/4/1/4>
- Møller P. (2015) Satisfaction, satiation and food behavior. *Current Opinion in Food Science*, 3:59–64
- Iversen K, Ptito M, Møller P and Kupers R (2015). Enhanced chemosensory detection of negative emotions in congenital blindness. *Neural Plasticity*, Article ID 469750, <http://dx.doi.org/10.1155/2015/469750>.
- White T, Møller P, Eichenbaum H, Köster E P, Linster C (2015). Olfactory Memory. Chapter in *Handbook of Olfaction and Gustation*, Third edition, revised and expanded, ed. Richard Doty, Marcel Dekker.
- Cameron E.L, Anderson M.R, Møller P (2016). The accuracy, consistency and speed of odor and picture naming. *Chem. Percept.* DOI 10.1007/s12078-016-9204-4 .
- Rischel HE, Nielsen LA, Gamborg M, Møller P, Holm J-C Jens-Christian Holm (2016). Comparison of sensory-specific satiety between normal weight and overweight children. *Appetite* 107, 486-493.

- Christoffersen GR, Laugesen JL, Møller P, Bredie WL, Liljendahl C and Viemose I (2016). Human Visual Evoked Potentials are Potentiated by Long-Term Visuo-Gustatory Conditioning. *Front. Hum. Neurosci. Conference Abstract: SAN2016 Meeting*. doi: 10.3389/conf.fnhum.2016.220.00066
- Møller P (2016). Madens smag. *Diætisten*, no.140, vol.24, 16-18.
- Møller P (2016). Eating and the brain: Food for thought. *Front. Hum. Neurosci. Conference Abstract: SAN2016 Meeting*. doi: 10.3389/conf.fnhum.2016.220.00125
- Andersen, B.V., Byrne, D.V., Bredie W.L.P., Møller, P. (2017) Cayenne pepper in a meal: Effect of oral heat on feelings of appetite, sensory specific desires and well-being. *Cayenne pepper in a meal: Effect of oral heat on feelings of appetite, sensory specific desires and well-being. Food Quality and Preference* vol. 60, doi: 10.1016/j.foodqual.2017.03.007
- DeCosta P., Møller P., Frøst M.B. & Olsen A (2017). Changing children's eating behaviour - A review of experimental research, *Appetite*, doi: 10.1016/j.appet.2017.03.004. Vol. 113, 1 June 2017, Pages 327-357
- Christoffersen G R J, Laugesen J L, Møller P, Bredie W L P, Schachtman T R, Liljendahl C, Viemose I (2017). Long-term Visuo-Gustatory Appetitive and Aversive Conditioning Potentiate Human Visual Evoked Potentials. *Front. Hum. Neurosci.*, 21 September 2017 <https://doi.org/10.3389/fnhum.2017.00467>.
- Møller P (2017). Smag som belønning: kvalitet vs kvantitet. Chapter in *Forståelser af Smag*. Eds. Liselotte Hedegaard and Jonathan Leer, Smag for Livet publication. (in press)