



Editorial

Perceiving stunting – Student research and the “Lieschen Müller effect” in nutrition science

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Children eat and children grow. Starvation leads to weight loss, and inhibits growth. Long-term starved populations are short and light. Upon refeeding, children catch-up in weight and height. This is trivial; even Lieschen Müller¹ knows it. So what is new about it?

Increasing evidence suggests that the link between food and growth is grossly overrated. Whereas the causality between starvation and growth impairment has never been questioned, the inverse relation connecting short stature with shortage of food, lacks substantiation (Goudet et al. 2016). Sguassero et al. (2012) carried out a meta-analysis of community-based supplementary feeding in children less than 5 years of age in low- and middle-income countries and concluded that supplementary feeding has only a negligible impact on child growth. Kristjansson et al. (2015) showed that even in socioeconomically disadvantaged children, when nutritionally supplemented, the net effect of nutrition on body height is generally small. Nabwera et al. (2017) concluded in a retrospective study that despite four decades of intensive interventions, substantial growth faltering still remains in rural Gambian children. Walker et al. (1996) investigated 122 stunted children recruited from a survey of poor neighborhoods in Kingston, Jamaica, who participated in a 2-yr randomized, controlled trial of supplementation beginning at ages 9–24 mo. The authors wrote: “four years after the intervention ended, when children were 7 to


8 yr old, there were no effects of supplementation on any anthropometric measure.” Yet quite in contrast to this evidence, the popular perception linking food and growth persists also in the scientific literature. At least since the seminal Nestlé nutrition workshop in 1988, where the terms “wasted, stunted, or wasted and stunted” (defining wasted as < 80% of reference median; and stunted as < 90% of reference median) were established as criteria of malnutrition (Waterlow 1988), “stunting” and “undernutrition” have increasingly been used as synonyms. Describing the mechanisms underlying linear growth failure in developing countries, Prendergast & Humphrey (2014) summarized: “Linear growth failure is the most common form of undernutrition globally.” Measuring stature has been adopted as a tool for detecting undernutrition, and considered appropriate for assessing the effectiveness of political decisions, and health and nutrition intervention programs.

Such persistence in the perception of stunting as a marker of famine is all the more surprising as the absence of an association between food and growth is known since the early 20th century when during and shortly after World War I, German pediatricians and school doctors quite independently stated that “the child’s longitudinal growth is largely independent of the extent and nature of the diet” (Schlesinger 1919). This state of information was repeated in the seminal work on human starvation published by Keys and coworkers in

¹ *Lieschen Müller is a placeholder for the average person in the German-speaking world. The average is often also referred to as “Lieschen Müller”. German parents tell their children Lieschen Müller stories to explain how the world works.*

1950 (Keys et al 1950), but disappeared from citations in the literature soon thereafter. The Eighth report of the FAO/WHO Expert Committee on Nutrition (Joint FAO/WHO Expert Committee on Nutrition, World Health Organization Technical Report Series, No. 477. Geneva, W.H.O., 1971) emphasized the importance of measurements of height or length, since the extent of height deficit in relation to age may be regarded as a measure of the duration of malnutrition. A year later this opinion was reinforced in the medical literature (Waterlow 1972). The concept was discussed in more detail e.g. by Seoane & Latham (1971), and quite broadly accepted after the Nestlé nutrition workshop in 1988 mentioned above.

We took this amazingly discrepant perception of food and growth as an example and an opportunity for modern students to discuss the problem of reconciling data with perception and scientific ‘truth’, at an International Student Summer School, held in July 2017 in Potsdam and nearby Gülpe, Germany. The present supplement volume consists of manuscripts resulting from this Summer School.

Perception is a matter of visibility. In 1920, Paul Klee (1920) wrote in *Schöpferische Konfession* (Creative Confession):  *does not reproduce the visible, but makes visible*” (*Kunst gibt nicht das Sichtbare wieder, sondern macht sichtbar*). We extended this citation and say: *science does not reproduce the visible, but makes visible*. Visibility is not only a matter of statistics, microscopes and telescopes, but a matter of perception that includes cognition and questioning. The archaic conception of Earth’s shape as a plane or disk, having dominated for centuries European sciences, is an impressive example of false cognition.

Instead of a commodity which is transported from one mind into another, visibility and knowledge, that is “truth” in the sense of a true picture of a reality that exists independent of us, can also be viewed as a property of an individual. The individual “links up” specific interpretations of experiences and ideas with his own reference of what is possible and viable. Ernst von Glasersfeld (1995) was a prominent proponent of radical constructivism. Radical constructivism replaces the term “truth” by “viability” within the world of personal experience. Personal experience is one’s own experience made by one’s own sensory perception. Individuals cannot exceed the limits of personal experience. The process of constructing knowledge, of understanding, thus depends on the individual’s subjective interpretation, not only on what “actually” occurs. Understanding and acting are circularly conjoined. Even if people use the same scientific knowledge successfully for themselves, it does not make it objectively true.

“Memory is the most important sensory organ: most of what we perceive, comes from memory. We always perceive through the ‘glasses’ of our memory because what we perceive, is explicitly determined by past perception (Roth 1992).”

We are interested in common concepts of life, in visibility, in knowledge and in truth. But this is not trivial. There is no objective truth. Everybody links specific interpretations of experiences and ideas with own references. These references establish early in life. Children take up their parents’ concepts. These concepts are based on prevalent cultural perception, and reflect popular wisdom, that is, Lieschen Müller’s wisdom. Lieschen Müller’s wisdom does not reflect scientific knowledge, but it may affect the scientist. Just remember when you did not clean your plate, Mom said: “eat”, otherwise “you will not grow”. Concepts that were transmitted early in life are beyond doubt, these arguments are strong. Just to make it clear: we do not question the link between essential nutrients and growth, we question the universal popular wisdom that links short stature and food; we question the judgement that whenever you see somebody who looks short, you may conclude: “this child did not eat well”. Considering knowledge as being based on personal experience puts another complexion on the perception of stunting and undernutrition. Modern Americans never experienced mass child starvation at first-hand in their home country. European pediatricians of the 20th century, however, did as they personally witnessed the sequelae of the political catastrophes during and after World War I. They were able to adjust popular arguments in view of their personal experience.

Students are not resistant to Lieschen Müller effects. But they are younger than their teachers, and hopefully flexible and open-minded. Many of the world’s greatest discoveries were made by young people in their twenties. These young people need platforms. This new open-access supplement will be such a platform for critical and innovative human biologists and bio-statisticians, and summarizes work performed by a group of international students who brought their own data for a joint analysis at the Summer School.

The manuscripts start with work on migrants (Bogin et al. 2018). Migrants are people who move from their place of birth to new places of residence. But in spite of the forces that have induced them to move, migrants still maintain cross-border ties (Mouw et al. 2014), and significant identification with their home country and culture (Waldinger 2008). Young migrants have dreams, and they differ in past experiences and current perception. Özer & Scheffler (2018) discuss the feeling of belongingness in young Turkish migrants raised in Germany, with physical growth and body height adjustments as social signals of integration. The observations on *strategic growth adjustments*, and *competitive growth processes* strengthen the concept of social connectedness being involved in the regulation of human growth. Elrayah et al. (2018) present anthropometric measurements performed in school children in Khartoum State, Sudan in 2014 and 2015. Undernutrition still is a relevant problem in Sudan, but contrasting prevalent hypotheses on stature being a mirror of the nutritional situation, the data rather reveal an amazingly weak relation between weight and height, and

highlight the importance of socioeconomic factors and living conditions on child and adolescent growth. Similarly, Scheffler et al. (2018) failed to detect influences of nutrition, sibship size, and monthly family expenditure on body height in a large sample of children and adolescents raised in Kolkata, India between 1982 and 2011. These authors also questioned current concepts regarding the impact of nutrition, and household and economic factors on growth. Bents et al. (2018) focused on the very particular Japanese geography. Based on body height data of the Japanese school health survey obtained in all the 47 Japanese prefectures, they demonstrate the significant influence of spatial connectedness on body height of four cohorts of male Japanese students measured in 1955, 1975, 1995, and 2015. Liu et al. (2018) add a note on the associations between body height and the current local political climate in the 47 prefectures of Japan providing evidence that traditional hierarchal political structures, with less attention to equal opportunities, social mobility, and social equality, seem to coincide with impaired physical growth of young people raised in such environments. Beger et al. (2018) conveyed longitudinal data of 5138 small-for-gestational-age (SGA) infants and children, of the Database Management System of CrescNet, University of Leipzig. While discussing these data within the student group, it became obvious that though most SGA infants experience compensatory growth (catch-up) after birth, some fail to do so. Absence of very early catch-up within the first 4 to 16 postnatal weeks is shown to strongly predict growth failure within the following 5 years, a new finding of great clinical importance. Mumm et al. (2018) analyzed a large set of cross-sectional and longitudinal data on body height and elbow breadth to develop reference centiles for external skeletal robusticity. This parameter is still not well-known, even though it is an easy-to-obtain indirect estimate physical activity levels in children and adolescents. Pruszkowska-Przybylska et al. (2018) present their work on the efficacy of vitamin D supplementation after birth in relation to season and breastfeeding. Jasch et al. (2018) present data on skeletal robusticity and health status of an early medieval South-West German population.

The manuscripts of this volume result from original data, brought along by students, discussed in the light of different personal backgrounds and education during a one-week meeting. This cooperation not only illustrated the impact of personal perception on the acquisition of knowledge, it helped to question standard concepts of knowledge, and laid the groundwork for future understanding of global issues relating to child health and nutrition.

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