ANNETTE TINGSTAD

QUALITY AND METHOD

Rising pictures in evaluation of food quality

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Quality and method
- rising pictures in evaluation of food quality
by Annette Tingstad

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SUMMARY

In this Ph.D. thesis, which is the result of interdisciplinary, international collaboration on the applicability of the *rising picture method*[1] for evaluation of food quality, the focus is on basic research, method research as well as practically-oriented research. The thesis covers fields like *philosophy of science* and *organic farming*, and also the application of interview methodology, rising picture methodology and digital image analysis.

The rising picture method was developed within the fields of biodynamic farming and the production of anthroposophic medicines during the period from the 1920s to the present day. It is a disputed method in quality research but its application, in a series of recent studies, has shown noteworthy results. It has, therefore, been the goal of the present project to investigate whether the rising picture method can become a common and scientifically accepted method for evaluation of food quality and, if so, under what conditions. In an attempt to make the research as *holistic* as possible, the phenomenon of *rising pictures* - as well as the concept of *quality* - has been illustrated in several different ways.

The basic research in the project has consisted of clarifying fundamental concepts within quality research, including what quality is, as well as focusing on connections that are considered important in understanding living organisms. It has also aimed to review fundamental anthroposophic concepts, a knowledge of which is considered a prerequisite for an attempt to reach an *understanding* of the traditional (anthroposophic) application of the rising picture method.

The methodological research in the project has consisted of reviewing the theory behind the three methods applied in the practical part of the project. These are a humanistic/sociological method, a so-called Goethean method, and a modern natural scientific method. Of these, the Goethean method has been given greatest emphasis since it is considered to be the least known of the three in scientific circles. The reviews of the methods gave an opportunity to show that there can be several paths to the goal within scientific research, and that it can be an advantage to be aware of the different methods' potentials and constraints before the choice of method is made.

The practical research in the project has consisted of three sub-projects, each of which has attempted to elucidate the applicability of the rising picture method. These are: a) an interview investigation involving nine rising picture researchers in Central Europe, b) a quality assessment of well defined carrots carried out with the aid of the rising picture method used traditionally, and c) an investigation into the possibility to treat rising pictures with digital image analysis. The results of the practical research are encouraging:

1 The name "rising picture method" is a direct translation of the German "die Steigbildmethode", which will be further explained in Chapter 1.

a) According to the interview investigation, seven out of the nine researchers interviewed have had positive experience with the rising picture method and eight of them recommend that further targeted work be carried out with the method.

b) In the practical rising picture investigation it was possible, in a blind experiment with the help of the rising picture method, to differentiate between two groups of fertilizer treatments. It was correctly evaluated that the compost-treated carrots formed one group, and the remaining carrots another. It was also possible in the compost group to determine which compost treatment comprised the biodynamic treatment and which the organic. In the other group it was not possible to determine which of the three fertilizer treatments comprised the mineral fertilizer, the aerated slurry and the control group. However, it was possible to rank all fertilizer treatments with regard to quality, evaluated in the following order: 1) Compost with added biodynamic preparations (highest quality), 2) compost treated organically, 3) aerated slurry, 4) mineral fertilizer and 5) control (lowest quality). The biggest differences in quality were found between the compost-treated carrots on the one hand, and the remaining fertilizer treatments on the other. No statistically significant differences in quality were observed with the use of traditional quality analyses of the carrots.

With the help of digital image analysis, it was possible in another blind experiment to separate rising pictures of carrots from three different fertilizer treatments (organic, biodynamic and conventional) with a very great degree of accuracy and small deviations between the results.

Even though the above results are encouraging, they all indicate that there is a need for *validation* of the rising picture method in order to be able to decide on its future applicability, including potentials and constraints, for evaluation of food quality. This validation can profitably take place in *multidisciplinary* collaboration with other interested researchers.

FOREWORD

This Ph.D. thesis is addressed to all those having an interest in philosophy, science and knowledge transfer of multidisciplinary research on an intentionally easy-to-understand level. It is also addressed to anyone with an interest in food quality.

The research project, of which the Ph.D. thesis is a result, was carried out over a five-year period as multidisciplinary collaboration with researchers from Denmark, Sweden, Finland, Norway, Germany, Holland, Switzerland, UK, France and the Czech Republic. My own education is in pharmacy and it is the first time that I have approached the professional fields of philosophy and organic farming or the use of interview methodology, the so-called rising picture methodology, and digital image analysis in an established setting at university level.

The starting-point of the Ph.D. thesis is the *rising picture method* - a method for quality assessment of food and medicinal plants, which was developed within biodynamic farming and production of anthroposophic medicines in Germany, Sweden and Switzerland. Within the area of food, the rising picture method has been used to evaluate the quality of agricultural crops such as wheat, beetroots, carrots, potatoes, cabbages and onions as well as milk, cheese, fruit juice, minced meat and beer, etc. In several studies of more recent date the method has been used in blind experiments to differentiate between organically, biodynamically and conventionally cultivated crops, etc. - and even with a high level of accuracy. The method is disputed, and it has been my wish to find out whether the rising picture method can become a common and scientifically accepted method for use in quality assessment, specifically of food.

Philosophy of science was the major subject and organic farming the minor in the Ph.D. project. I did not think that I could become a "Doctor of philosophy" - which is the direct Danish translation of the Ph.D. title - at the Royal Veterinary and Agricultural University in Copenhagen (KVL) without knowing something about philosophy and theory of science and, therefore, I decided to go all the way and undertake my Ph.D. study[2], majoring in philosophy of science.

The word philosophy - love of wisdom - comes from the Greek *philia*, love, and *sofia*, wisdom. Philosophy of science is love of wisdom within the sciences. The question of what knowledge - as opposed to belief - really is, is a basic problem within all philosophy. In practice, philosophy of science is the part of philosophy that deals with the knowledge- and value-related problems that arise within the sciences - and it is relevant for all researchers

2 A Ph.D. study is a research education, which gives competence to work independently within research and development. See *Ph.D. studies at the Faculty of Science* (1993). University of Copenhagen, Denmark, pp. 14-15, for content of and requirements for a Ph.D. study.

to be familiar with this area. In my case it had special relevance because my starting-point was untraditional.

The initiative for, and elaboration of, both project and thesis have been my own from beginning to end, and like any Ph.D. student I alone bear the responsibility for the result. However, I have been extremely well supported by my supervisors, Carsten Bengt-Pedersen, lecturer, Ph.D., and Professor Ole Fogh Kirkeby, Doctor of Philosophy, as well as by the head of the Chemistry Department at KVL, Søren Storgaard Jørgensen, Ph.D. - to each of whom I wish to extend my warmest thanks.

I would also like to thank my main grant donor, the Directorate for Food, Fisheries and Agri Business at the Ministry of Food, Agriculture and Fisheries in Copenhagen, for financial support during the period of the project, and especially Anne G. Lauridsen, administrator, for personal contact throughout the process. Furthermore I wish to thank the following Danish foundations for valuable support: Fond af 1. juni 1962, Den Grønne Fond, Flory Gates stipendiefond Fred med Jorden, Karen Louise Nielsens Fond til fremme af Biodynamisk Jordbrug, Rudolf Steiner Stiftelsen, Stiftelsen for Goetheanistisk Kunst og Videnskab, Bodil Pedersen Fonden, Direktør E. Danielsen og Hustrus Fond, Husebystiftelsen, Frode V. Nyegaard og Hustrus Fond, and Balderfonden.

Finally I would like to thank everyone else who has shown interest in the project, including my many collaborators as well as my friends and closest family, for patient perusal of the initial manuscript, all constructive comments and other loyal support and encouragement.

KVL, March 2001

Annette Tingstad

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WONDERING AT THE BEGINNING

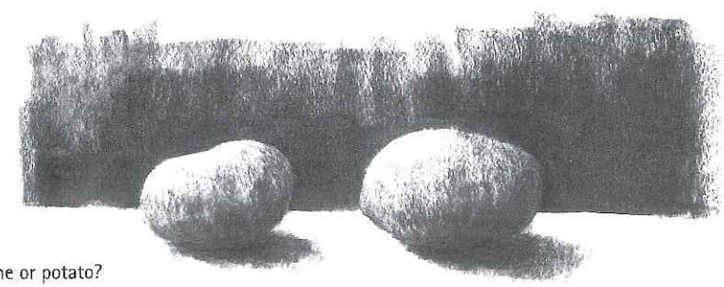
- about a stone and a potato

Imagine it is autumn - late October or November. Most of the leaves have fallen from the trees and are lying like a red-golden carpet over the earth. Along the edge of the field on your left are grey silhouettes of beech trees wrapped in a light mist, and the field under your feet is a muddy mix of wet soil, rotting leaves and stems. You trudge along, hunched over, hands almost touching your rubber boots which are both caked in clay. Your head is almost empty of thoughts and you are in full swing harvesting potatoes. In one place you can take up a handful with no trouble at all, in another you need the help of your spade to coax them up. An even rhythm shifts the potatoes from soil to bucket.

At some point you pick up a stone and are about to throw it away - towards the edge of the field. But what's this? You stop for a moment and ask yourself whether it was a potato after all. How can you actually tell the difference - between a stone and a potato? It may seem like a ridiculous question but you decide to take a rest and straighten your back while you think about it.

Well, what are the differences between a stone and a potato? Both are roundish and have an even surface, and both are hard and heavy. Both fall to the ground if you let go of them, and the imprints that they leave on the soil look similar. Neither the stone nor the potato allow light to penetrate them, but both make shadows - and your finger meets with resistance when you press on them. In both cases their surface is hard.

But the inside of a stone is very much the same as the outside - that is true at any rate of the sample of sandstone that you have dug up here - while the inside of a potato is quite different from the outside. Where the rabbits have had a chew at the potatoes, they glisten yellow-white and some have gone mushy inside. This reminds you of the ones you planted



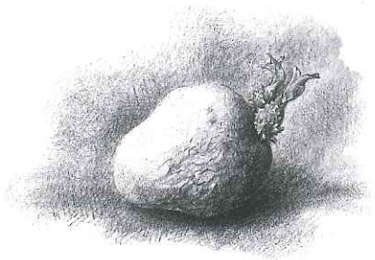
Stone or potato?

in the spring. Maybe it's one of them that now forms a rotting, wet mass. But where have the *new* potatoes come from?

If you think back to the spring, the tubers you planted then were quite different, with their dried-up wrinkled skins and here and there white whiskers and small purple-green sprouts. You had to be careful to put them in the soil with the whiskery roots down and the sprouts up, and you had to remember to remove all but the biggest sprouts. But how has such a wrinkled old thing been able to produce this mass of new potatoes? Of course meanwhile a green bushy plant - the potato plant - grew up, but does that explain how the new potatoes came into existence?

While you think about that, yet another question comes to you, namely how in the world have all the mighty beech trees standing along the edge of the field been able to grow out of a few tiny beechnuts? Right now lots of these fruits of the beech tree are lying scattered at random among all the autumn leaves. It seems almost impossible that trees could grow out of them - but nevertheless it has happened, and the same thing happens every single year.

The differences between a stone and a potato now begin to become clearer to you. If the potato is left to itself, in time it will change - all by itself. Left in a cellar or under a kitchen sink, all potatoes in the northern hemisphere will begin to dry up and produce white "whiskers" and sprouts at the beginning of the year. The stones, which have also found their way down into the cellar or under the kitchen sink, will not do that. However insistently you rub them, breathe on them or spray water on them, they won't grow. It doesn't help either to switch on the light. Growth is a change that happens over time, and which cannot be explained by outside factors alone like heat, light or water.



A sprouting potato

The speed at which growth occurs can be increased or decreased depending on the outer factors I have mentioned, but growth in itself is to a certain degree independent of these. It just happens. If you stand with a potato in one hand and a stone in the other, you may be able to sense that the one seems "alive" while the other seems "dead".

Without too much effort you have thus been able to recognize the main differences between a stone and a potato: The potato has the capacity for growth and can over time change its form spontaneously. The potato has life in a way the stone does not[3].

3 The above example is based on Colquhoun, Margaret & Ewald, Axel (1996): *New Eyes for Plants*. Hawthorn Press, Lansdown, Stroud, UK, pp. 8-13. The two charcoal drawings by Axel Ewald are reproduced with kind permission of the publishers.

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