Reflections on Temperature-Warmth Course Lecture III

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1. Introduction

A small group in Christchurch, New Zealand, has been studying the Warmth course[1]. Two members of the group, of which I was one, realised that Steiner's treatment of temperature lacks clarity and homogeneity. Both of us have a scientific training (i.e. mathematics and chemistry/physics) and are reasonably aware of the conventional view of temperature as a number. Incidently, we both realised that in previous readings of these lectures, we hadn't noticed this very unconventional treatment of temperature. And the glaring contradiction in lecture 3.

I can understand the difficulties of stenographers (or attendees taking notes) with the content of Steiner's lectures and therefore accept that the text is correct as far as listeners understood what Steiner was talking about. What I don't understand is that the editors, of this edition Balastèr and Dollfus, only have one comment on lecture three, unrelated to Steiner's discussion of the notion of temperature.

2. Steiner's discussion of phase transitions

Half way down the 1st part of lecture 3[2] you find the following statement:

> *"Während des Vorganges des Schmelzens zeigt sich an dem Thermometer kein Ansteigen der Temperatur.* Dabei darf man aber nicht glauben, dass das Wärmewesen selber unbeteiligt ist. *[...]"*
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> *"During the process of melting the thermometer shows no increase in temperature.* However, that shouldn't lead us to believe that the Being of Warmth is not involved[3]".

1 *Steiner, R.* (1920): Geisteswissenschaftliche Impulse zur Entwickelung der Physik. Die Wärme auf der Grenze positiver und negativer Materialität (quoted as Wärme-Kurs, GA 321), Dornach 1972; Warmth Course, New York 1988. These lectures were held in Stuttgart in 1920 for science teachers of the first Waldorf school.

2 German edition, p. 46, half way down paragraph 1; English edition, p. 31, half way down pararagraph 2.

3 Paragraph 2 of the 1988 English edition has an incorrect translation: "[…] no increase in temperature. It must not be concluded from this, however, that no heat is being absorbed" (this in itself is a correct statement, but a very wrong and misleading

The same statement also applies to the boiling of water, under normal circumstances the temperature remains at 100° until all water has evaporated and becomes steam.

Steiner states categorically that the Being of Warmth is involved in melting and boiling, i.e. 1st order phase changes, which are all phase changes in which the temperature does not change during the process considered. An ardent materialist will rubbish Steiner's contention, anyone else can, if they so wish, keep an open mind. Steiner, in other words, opens the discussion regarding physics to include the activity of beings from a non-physical or spiritual world, for most readers of 'Elemente' not a world shattering event.

3. The concept of temperature

We all feel the difference between cold and warm, but not every one to the same degree; we can also say: A is hotter or colder than B, or that D is much/less colder than B, but we can't put a number to this 'much' or 'less'. The Greeks, around 450 BC, developed an instrument that indicated a change in the sensation of hotness, the thermoscope, a warmth indicator; around 350 AD Galen added a scale.

The statement hot or cold is with respect to our body temperature, which is not the same for everybody. We can't quantify this feeling; to do that we need an instrument of some kind. In the 18th century the first working thermometers were made: in 1714 by Fahrenheit and in 1742 by Celsius. Both consisted of a glass tube, fitted to a bulb at one end, containing mercury, and sealed at the other. Celsius chose as reference points the level mercury reached when the bulb was placed in a mixture of water and ice; the second level was reached when the thermometer was placed in boiling water. To the first level he gave the number 100 and to the second level he gave the number 0; he divided the distance between 100 and 0 into 100 equal parts[4].

Using thermometers makes it possible to talk about the temperature of a room, a flame or a piece of solid carbon dioxide. The use of the concept temperature also makes it easier to talk about heat or warmth, it makes it possible to talk about warm or cold in a less subjective way; a room with an

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translation). The correct translation of the German is: […] no increase of temperature. *However, that shouldn't lead us to believe that the Being of Warmth is not involved. (my translation)*

4 This was later changed to 0 for ice and water and 100 for boiling water; this became the centigrade scale, used in most countries except the US which uses the Fahrenheit scale. The scientific community uses the Kelvin scale. We must realise that these choices are arbitrary and that the only physical phenomenon the thermometer reflects is that substances expand when heated.