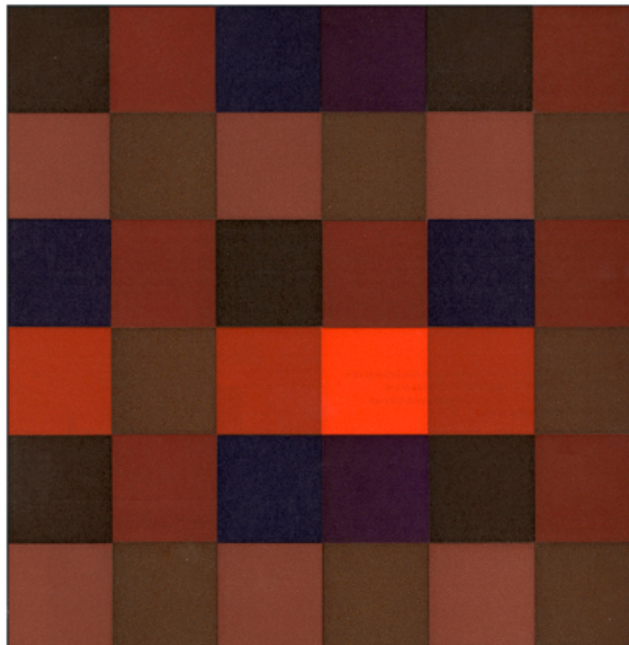




Ludwig Wittgenstein & Max Bill  
28 May 2014

When we started into the phase II of the seminar (which is dedicated to »the algorithmic principle in engineering and design, science & art«), we studied to some extent the Euclidean algorithm to determine the greatest common divider of two natural numbers; a simple subdivision method to approximately determine the value of an integral (which is equivalent to determining the area content of a geometric figure); a painting by Max Bill, its combinatorics content, and its embedding, by parameterization, into a huge class of paintings that would contain, as one single case, Max Bill's.

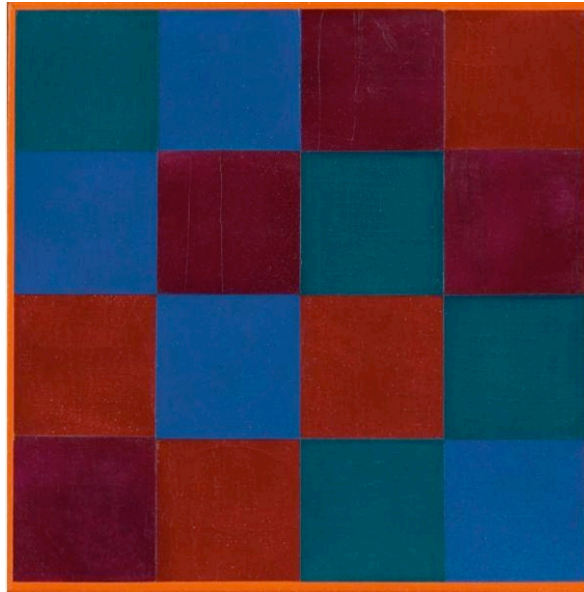
Here is, for your memory the painting that you may consider as a visualization of the four partitionings of the number 9 into two additive numbers:  $9 = 8 + 1 = 7 + 2 = 6 + 3 = 5 + 4$ .



Max Bill:( title year)

Remember, the trick to discover how deep this flat image really is, is the observation of  $9 = 1 + 8$ , but also  $2 + 7$ , then  $3 + 6$ , and  $4 + 5$ . The second trick is to find by inspection the 3-by-3 subfields that are needed in order to display one

of those partitionings of the number 9. It may be nice to see that Bill has done similar images about other topics. See this one and analyze it in a way analogous to the one we have used in the case of the first image. It should be quite easy to identify the pattern used here.



Max Bill: four equal groups of four, 1970

However, we started and ended with Ludwig Wittgenstein's *Tractatus Logico-Philosophicus* (German: 1921, English: 1922). He wrote this incredible book in 1918, at age of 29 (he lived from 1889 to 1951), and didn't publish much more during his life. The last paragraph of his own preface to the *Tractatus* reads thus:

... the truth of the thoughts that are here set forth seems to me unassailable and definitive. I therefore believe myself to have found, on all essential points, the final solution of the problems. And if I am not mistaken in this belief, then the second thing in which the value of this work consists is that it shows how little is achieved when these problems are solved.

The actual text, by the way, divided as it is into numbered paragraphs of a hierarchy, starts this way:

- 1        The world is all that is the case.
- 1.1     The world is the totality of facts, not of things.
- 1.11    The world is determined by the facts, and by their being all the facts.

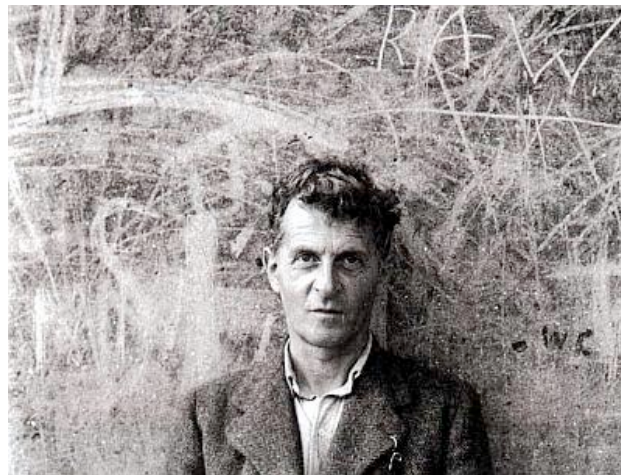
What we see here, at this beginning of a philosophical treatise of which its author claims to have solved all the problems, is a shift of all considerations about the world away from the *things*, those givens that we see and smell and taste and feel and deal with in even other ways as we are roaming the crust of the earth, and towards the *facts*. The facts, however, are linguistic forms, sentences, statements, assertions, claims, propositions – products of the mind as we are perceiving the world as it is given and made. Those products of the mind, signs really, semiotic creatures, for Wittgenstein constitute the world, that that he concentrates his attention and effort to. Things are there, a materialist would never deny. But that's not so interesting for the logician. They are the reason only for statements, facts, that we consider.

Do you feel how much this is the philosophy needed for the world of computing? Because in computing, what we deal with is a particular kind of stating facts: as data and algorithms. We are always already in the semiotic dimension, in its algorithmic layers. Here is a bit more, from close to the end of the treatise:

- 6.5 When the answer cannot be put into words, neither can the question be put into words.  
The riddle does not exist.  
If a question can be framed at all, it is also *possible* to answer it.
- 6.52 We feel that even when all possible scientific questions have been answered, the problems of life remain completely untouched. Of course there are then no questions left, and this itself is the answer.
- 6.522 There are, indeed, things that cannot be put into words. They *make themselves manifest*. They are what is mystical.  
(The German here is more clear: »Es gibt allerdings Unausprechliches. Dieses zeigt sich, es ist das Mystische.«)

The *Tractatus* ends on the, perhaps, most famous statement of the philosophy of the XXth century:

- 7 What we cannot speak about we must consign to silence.



Ludwig Wittgenstein (photo by Ben Richards)