The Use of phenomenology: Mathematics and Mysticism

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Abstract

Based on phenomenological observations obtained during intensive insight-meditation, a model is formulated about part of the functioning of the human mind. The model has been translated into neurophysiological hypotheses and some initial experiments for the verification of these have been performed. Some methodological considerations about the use of phenomenology are given.

1. The consciousness problem

Hearing sound is often explained as follows. "Sound consists of waves (in the pressure) of air. This reaches our ear tympani. Through a mechanical pathway some hairs are brought into vibration, depending on the wavelengths present in the (Fourier analysis of the) sound. These then excite some neurons that start to fire. When the resulting action potentials reach the cortex hearing will result." Of course this last step is utterly unclear: there is an explanatory gap. This is the consciousness problem: how do firing neurons cause subjective awareness of sound?

A useful distinction has been made by Chalmers [1996]. The *easy* consciousness problem asks how the brain works and how it leads to our behavior. Chalmers estimates that it will take at least 200 year before this query will be answered. The *hard* consciousness problem asks on top of this how it is possible that we become aware of what happens to us. This notion of 'being aware' cannot be explained any better. But we know that while we perceive and act, things are not going on 'in the dark', as would be presumably the case in a hominid robot. We see that the hard question is already difficult to formulate; to answer it seems even impossible. Searle

[1984] gives an *a priori* argument against any possible explanation. He argues that any answer to the hard question (probably) can be implemented on a computer and hence (by Turing's analysis of computability) be played as a social game with billions of people. But then as a side-effect consciousness should suddenly be there, which is hard to imagine.

2. Phenomenology as a tool

Ordinary consciousness is already special. For an extreme form of it, the mystical state, this is the case even more so. Staal [1975] argued that mysticism is neither rational nor irrational, but is consists of experience and as such can be studied in a rational way. Staal moreover noticed that it occurs in almost all cultures, but that different underlying models are given. Finally he gave as advice to study mysticism by practicing meditation and obtaining first-hand information. In Barendregt [1988] logical explanations of contradictions occurring in the writings of mystics are given: language is usually introduced for a certain domain; if that domain is expanded, but the language is not, then some contradictions may occur in a natural way. It is, however, possible to avoid the paradoxical language.

Before going to report on this, some methodological considerations about the method of phenomenology, i.e. observing consciousness as is presented to us. A century ago there had been an interest in psychology in obtaining results via introspection, see Wundt [1896]. This attempt failed because the results were not congruent, too much dependent on the projections of the observer.

As argued by Husserl, Brouwer and Gödel mathematics is a science that successfully depends on phenomenology. Its success of course depends on proofs and calculations, but the correctness of the prof and the computation (within the given context) need to be verified by the human mind. This requires some training[1]. Using the trained minds of mathematicians proofs are still based on introspection, but their validity becomes inter-subjective.

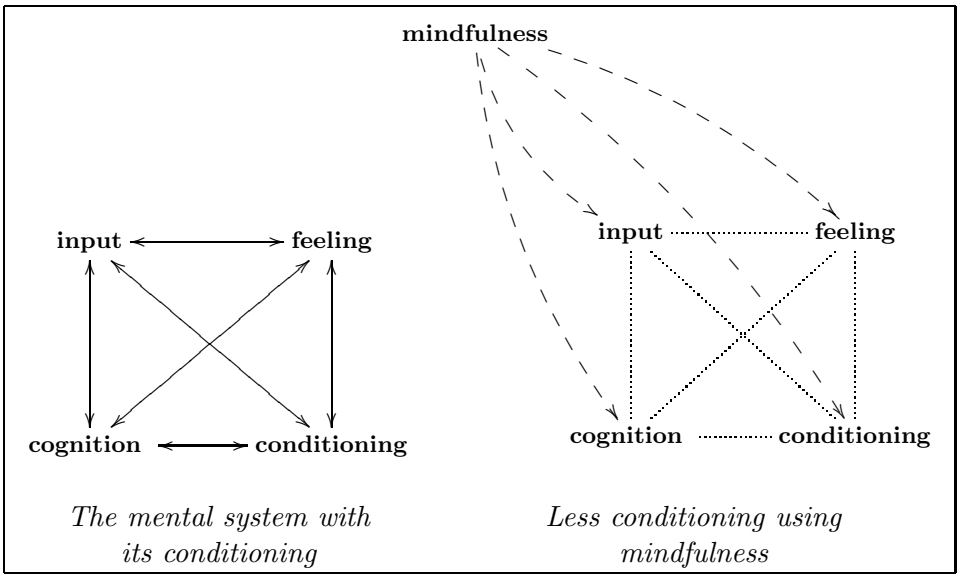
By our curiosity towards the nature of consciousness and inspired by the exhortation of Staal we have been following intensive practice periods of so called insight-meditation, as reported in Barendregt [1988]. A model of some aspects of the human mind has been reported in Barendregt [1996].

[1] If the training is insufficient, one may become a mathematical crank, i.e. someone that claims to have proved a (usually famous) open problem, or to have disproved a (famous) theorem. It is next to impossible to explain to a crank that their results are wrong. They usually develop a conspiracy syndrome, thinking that the establishment of mathematicians wants to hide their results.

Since there are—unlike the case with mathematics—some claims with an empirical character, there should be an operationalization and an independent experimental verification. The present talk is a report on initial work in this direction.

3. Insight-meditation

This consists of the development of mindfulness, i.e. observing our consciousness with a certain distance to the content of the consciousness[2]. Our mind is seen as a process between collaborating subunits: input, feeling, cognition and output. Input comes from the senses (and memory is considered as sensory input); feeling gives a value judgment; cognition distinguishes this from that; output consists of intentions to act and are felt as volition. These groups constantly interact with each other and determine our behavior and states of mind. Using mindfulness one can partially stop the process and choose whether it should go on as it did or modify it.



The mental system with its conditioning

Less conditioning using mindfulness

[2]A (lower) monkey can be caught by putting a banana in a hollow tree behind a small hole. The monkey can put his hand through the hole and grab the banana, but then his hand cannot go out. Even when people come with a cage to catch him (and he knows this), his desire for the banana is too big to let go of it. Chimpanzees and orang-utans, however, are able to let the banana go. If they do this the same way as the meditator would, they would observe: "There is desire," (not thinking of the banana, but just seeing the desire), "there is danger" (the people with the cage) and then they can let go the banana.

Using mindfulness our consciousness is split into components. This is a well-known phenomenon. For example repeatedly pronouncing a word causes a *semantic fatigue*, in which the meaning seems to have disappeared. Actually the meaning does not disappear, but the sound (input) and the meaning (cognition) that are usually together are becoming separated. Something similar is possible with pain, either by breaking the link between pain (feeling) and conditioning (reacting) or between the input and the formation of pain.

4. Cover-up model of the mind

Practicing intensely the application of mindfulness to break the usual system of input and output via feeling and conditioning, it may happen that one reaches a dissociated state of mind. It is said that in Tibetan monasteries there are people from the village with this mental disturbance kept as an example to the meditators of *things that may happen*. It is also explained that for the meditators this state is transient. Having gone through all of this, in Barendregt [1996] the following *cover-up model* of the mind has been proposed.

1. In our potential consciousness there is a *process* with three characteristics: (i) it is in a constant flux; (ii) it is unbearable, nauseating; (iii) it is beyond our control.

2. Usually the process is hidden from our conscious awareness by a "concentration of feeling" as a cover-up[3].

3. By means of trained mindfulness the process can be brought under control.

An important part of our daily life consists of a constant struggle trying to cover-up the process. As the concentration of the hiding stuff is dependent on circumstances we become dependent (addicted) to our situation in which this happens successfully. Of course this is a symptomatic treatment. Two extreme values of the cover-up are less well-known: mystical experiences with a lot of cover-up, and the state of dissociation with little cover-up.

5. Neurophysiological translation

The cover-up model is translated as follows in neurophysiological terms.

[3]This model extends a model of my father, Barendregt [1982], who described phobias as cover-up of depersonalization

1. The binding problem asks how our various inputs, cognitions, feelings and reactions come together as mental events. One suggestion is (see von der Malsburg [1981], Singer et al. [1995]) that mental states are coded as subsets of the collection of neurons that fire in synchrony. (A subset of a set X is an element of the power set $\mathcal{P}(X)$, hence the name 'power brain'). Hypothesis. The operating system of our mind is correlated with the fluctuating subsets of synchronously firing neurons. In psychopathological patients as well as in insight-meditators one obtains a view of this chaotic neural storm that underlies our normal mental functioning.

2. The idea of volume transmission in the brain, see Agnati [2000], is suggested as a neuronal mechanism in which the neuro-messengers are not transmitted via a synapse, but as a broadcast through the extra-cellular fluid or the cerebro-spinal fluid (liquor). In the mystical state the subject still can perceive pain, but no longer minds it. Opioids injected in the spinal liquor have a similar effect. Hypothesis. The liquor in the brain ventricles is used for a broadcast of chemical messengers, including opioids. Additional arguments for this ventricle hypothesis: (i) the broadcast through the liquor is faster than in the rest of the brain; moreover, it is on a timescale compatible with emotions; (ii) the limbic system is nearby (para-ventricular organs).

3. The practice of mindfulness (detached attention) on all mind/body phenomena can lead to an increased awareness and insight. This may cut through vicious circles. Hypothesis. The purification (deconditioning) of the mind using mindfulness is caused by increased cortical control. The mental development of mindfulness can be used effectively as treatment for various emotional and psychopathological disorders. For initial evidence of the second part see Kabat-Zinn [1990], Segal et al. [2002], Baer [in press] and Giommi et al. [submitted]. This treatment has also been applied to chronic pain and terminal patients. In the latter two cases the treatment was directed towards a decrease of the suffering.

6. Experiments

For the cover-up model notably the second aspect has been subject of study in an Ph.D. project with E. Roubos and J. Veening. In Calle et al. [2002] it has been reported that there are ventricle contacting neurons containing the "opioids" met-enkephalin, β-endorphin, and even real morphine; also the "stress"-hormone CRH has been found in a ventricle contacting neuron.

Moreover cells containing 1,2-endomorphin have been found near the ventricles. EM pictures of exocytosis towards the liquor have been taken, but no proof yet that the above messengers are involved. These empirical results have been obtained with the brain of Xenopus Laevis, but the part of the brain involved is known to be very conservative over evolution. (Work in progress.)

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