

Olfaction, Philosophy, and the Missing Object

Bernd Lindemann

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LETTER TO THE EDITOR

Dear Sir!

In a recent review (Lindemann 2017) on Andreas Keller's book "Philosophy of Olfactory Perception" (Keller 2016) I pointed out that the suggested detection of 'free-floating' properties, i.e. properties not owned by a physical object, is ontologically impossible (e.g. Bunge and Mahner 2004). This conclusion may be justified as follows:

The reality of classical mechanics comprises concrete objects which are constituted and characterised by their properties (e.g. Bundle theory 2017; Physical body 2017; Physical property 2017). Odour molecules, for instance, are concrete objects. They are defined in space and time and able to interact with other concrete objects within the bounds of their molecular properties. A property abstracted from its object, however, is not concrete but an abstract. It is not defined in space and time and will not interact. Philosophy knows the 'fallacy of mistaken concreteness' or 'reification': To treat an abstract as if it were concrete (List of fallacies 2017; Reifikation 2017; Whitehead 1925). To say that in olfaction objectless properties are detected, is a reification. For detection requires interaction with a molecular receptor and such interaction cannot be achieved by an abstract.

Is this philosophical principle in agreement with the molecular processes of olfactory perception? Generally, one type of odour molecule bears several chemical properties which trigger several types of olfactory receptors mounted on many neurons. Subsequent events of transduction generate neuronal messages which convey sensory data.

As always, the data consist of a rapidly variable part and a related stationary, contextual part (e.g. Lindemann 2014). The rapidly variable part is spike-encoded and travels along the afferent nerve fibres to the olfactory bulb. Each fibre is a "labelled line" which conveys quantity (intensity) and answers the question "How much?" (Foerster 1985). The related stationary part of the data (the label) is given by receptor specificity and neuronal connectivity. It specifies which type of receptor was activated and implies that the receptor activated has interacted with a physical object of sufficient binding affinity, indicating a property *xy*.

Let us look at the primary message transported by a single sensory nerve fibre. Taking account of the connectivity and the receptor specificity, the message amounts to a statement (in a simple case) like: "*An object with property *xy* is detected at intensity *z**". (1) Note that detected is a concrete object because only such an object can trigger a receptor interactively and that (2) the object is not specified, except for the one observation that it has property *xy*.

The sensory input provided by many fibres, on occasion rapidly changing, results in a constantly updated activity spectrum (fingerprint or across-fibre-pattern), constructed by plotting the variable vs. the stationary part of the data. At any instant of time it reveals numerous detected properties of the odour molecules, which together

er indicate odour quality. The population message amounts to, say: “*The object of quality ab is detected at intensity z*”, identifying the object which has triggered the receptors by its associated quality. After filtering in the olfactory bulb, the complex population response of mitral cells, which is under debate, will still carry information *about* a concrete molecular object interacting with multiple receptors. The object is not missing, it is the topic of the sensory messages.

Further processing gives rise to a conscious percept which may be monomodal (featuring the smell of a rose) or multimodal (representing a rose).

Summary and conclusion: The claim that in olfaction objectless (free-floating) properties are detected treats abstract properties as if they were concrete. This fallacy is known as “reification”. Rather, it is concrete volatile molecules owning chemical properties which are detected by receptor action. Each sensory nerve fibre acts as a labelled line, attributing a single property to the object detected. The population response across many sensory fibres amounts to a characteristic pattern of many properties, attributing *quality* to the olfactory object, thereby identifying this object. The case shows that philosophy may aid experimental research by a careful clarification of the concepts used.

References

- Bundle theory; Available online: https://en.wikipedia.org/wiki/Bundle_theory (accessed 31 October 2017)
- Bunge MA, Mahner M, 2004. Über die Natur der Dinge. Hirzel, Stuttgart, see page 22ff.
- Foerster H von, 1985. Sicht und Einsicht. Versuche zu einer operativen Erkenntnistheorie, Heidelberg: Carl-Auer 1999.
- Keller A, 2016. Philosophy of Olfactory Perception. palgrave, NewYork, see page 85.
- Lindemann B. 2014. Mechanisms in World and Mind. imprint academic, Exeter, UK, see page 64ff.
- Lindemann B, 2017. Objects, Properties, Percepts: a Philosopher's Sniff. *Chemical Senses* 42(9): 789–791.
- List of fallacies; Available online: https://en.wikipedia.org/wiki/List_of_fallacies (accessed 31 October 2017)
- Physical body; Available online: https://en.wikipedia.org/wiki/Physical_body (accessed 31 October 2017)
- Physical property; Available online: https://en.wikipedia.org/wiki/Physical_property (accessed 31 October 2017)
- Reifikation; Available online: <https://de.wikipedia.org/wiki/Reifikation> (accessed 31 October 2017)
- Whitehead AN, 1925. Science and the Modern World (The Lowell Lectures). Reprint 1967, New York: Free Press, Macmillan Publishing Co, Inc., see page 51.

Bernd Lindemann
FR Physiologie,
Universität des Saarlandes
66421 Homburg, Germany.
bernd.lindemann@uks.eu

