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Smelling the Brain’s Creation

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It is not unusual in the philosophy of perception to use empirical research to build arguments against or in favour of a certain philosophical view (see Phillips 2016 for a scrutinizing discussion). This methodology is what Barwich uses in her book entitled *Smellosophy* (2020) when criticizing an approach to olfaction according to which ‘truthful perception is an accurate mental representation of physical properties’ (Barwich 2020: 310).¹ Furthermore, Barwich would like neuroscience to set the agenda for philosophical questions about olfaction, so that empirical evidence is not just used to adjudicate between existing philosophical theories but instead inspires new ones, such as Barwich’s own. Thus, while her main focus is first-order theories of olfaction, she also aims to exemplify a methodology for developing and assessing such theories that ‘break[s] down the silos of institutionalized disciplinaryity that are neatly dividing philosophical from neuroscientific inquiry’ (Barwich 2020: 311).

The ways in which Barwich arrives at and justifies claims about olfaction give rise to various questions about the relationship between philosophical discussion of perception and neuroscientific results concerning how the brain works. In part 1 of this critical notice, I look at the approach to olfaction that Barwich criticizes and raise a few of these questions. This leads to a query about exactly how the approach differs from Barwich’s own view of olfaction. Part 2 discusses selected aspects of her view. I examine how her claim that olfaction is both exteroceptive and interoceptive and the associated idea that the brain creates odours relate to the empirical research she presents. This leads to a query concerning her methodology, which uses empirical research about brain processing to arrive at conclusions concerning a subject’s experience.

My discussion of Barwich’s book does not meet the book on its own terms. First and foremost, the book is an engaging presentation of an impressive amount of interesting empirical research on olfaction, telling a tale about the history of the field and bringing together the live voices of the top researchers whom Barwich has interviewed. It gives

1 A. S. Barwich, *Smellosophy: What the Nose Tells the Mind*, Harvard University Press, 2020, 384pp.

the reader a deep understanding of olfaction and how it is studied. My discussion of the book focuses on the philosophical claims and positions it mentions, endeavouring to reconstruct what I think can be regarded as justifications and elaborations of them. Since Barwich does make some philosophical claims and conclusions, I think this endeavour is not misplaced and hopefully helpful, although there is a significant part of Barwich's contribution that it does not address.

1. *Criticism of the representational approach*

The approach to olfaction that Barwich criticizes is explained as originating from a time when vision was the centre of attention in both neuroscience and philosophy. In neuroscience, the approach involves working under the assumption that there are specialized brain regions for particular features (e.g. shape). Sometimes, the approach is associated with the idea of mapping odours onto neural structures. Other times, the different but related idea of transparent stimulus-response models that mirror the world is her target. In philosophy, the approach is briefly associated with representational theories of perceptual experience, without going into the literature on this (Barwich 2020: 310). Whether Barwich succeeds in targeting representational theories is a question I leave aside for present purposes. Instead, I focus on her characterization of the target approach early on in the book as '[t]he idea that our mental life is, in one way or another, a representational expression of physical structures' (Barwich 2020: 11). For ease of reference, I will call this the *representational approach*.

What it means that our mental life is a 'representational expression of physical structures' is, sadly, not further explicated. However, also Barwich thinks that 'psychological phenomena are expressions of neural processes' (Barwich 2020: 9). What distinguishes her view from representational approaches thus seems to be that physical structures, such as neural processes, are not just 'expressed' in our mental life, but *representationally* 'expressed' in it. Representation for Barwich seems to be linked to the external and to accuracy conditions: 'For perception to be representational means that it expresses a mental image that, in some way or another, relates to external features in the world, implying that there must be some form of success or accuracy condition' (Barwich 2020: 88). Why relating to external features implies accuracy is puzzling here. However, let us just accept that Barwich thinks so and that this notion of representation is part of her characterization of the representational approach, as is also hinted in her characterization of the approach later in the book as the view that 'truthful perception is an accurate mental representation of physical properties' (Barwich 2020: 310). Thus, the representational approach that Barwich criticizes seems to involve taking something physical and external to the mind to be 'expressed' in our olfactory mental states, in such a way that this relation of 'expression' can be evaluated for accuracy.

Empirical research on olfaction reveals two overall reasons why the representational approach is misguided and 'doomed to fail' (Barwich 2020: 11), according to Barwich. They are:

- (i) that the chemistry of molecules is insufficient to explain our olfactory experiences and
- (ii) that our biology and neurology is part of that explanation.

In the two next subsections, I try to reconstruct how Barwich thinks these reasons tell against a representational approach, looking at a few selected parts of the empirical research that she discusses.

1.1 *The insufficiency of molecular chemistry*

An example of someone Barwich thinks uses a representational approach to olfaction seems to be Young (2016). His *Molecular Structure Theory* claims that the object of olfactory experience is, and is explained by, the molecular structure of chemical compounds within odour plumes. For instance, that a certain smell is the smell of lavender is explained by the molecular structure of what enters one's nose, while properties of the plume explain the smell's identity and varying intensity from one location to another. Young's view is dismissed very quickly: 'this won't help you to understand olfaction, let alone provide a model to analyze the content of odor perception' (Barwich 2020: 105). Why not? Barwich's immediate justification feeds into reason (i) above: the relationship between the olfactory qualities we experience and the chemistry of the molecules that we on these occasions are in contact with is 'exceedingly complex' (Barwich 2020). This justification is puzzling, for why should exceeding complexity in this relationship prevent analysis of it from even *helping* us to understand olfaction?

However, perhaps it is not really the extent of complexity, but the nature of it, that Barwich thinks makes Young approach unhelpful. She goes on to explain that the relationship between qualities and molecular chemistry is not 'a linear structure-odor correspondence' (Barwich 2020: 105–6). Rather, molecules with different chemical structures can cause similar qualities for us to experience, and similar ones can cause different qualities (Barwich 2020: 106). What is unclear to me is why a representational approach and Young's view cannot accommodate this fact and instead must provide a linear mapping from molecular structure to olfactory quality.

For instance, that the representational approach employs accuracy conditions to represent the mental life of a subject need not imply such linear mappings. For there are many ways to construe accuracy conditions. One possibility, albeit perhaps odd, would be disjunctive conditions like the following: 'Perceiver S has an olfactory experience of musk' is accurate *iff* the molecules S is in contact with are Tonalid or Helvetolide or Muscone or (insert the reminder of musk molecules). This would open for the possibility that molecules with different chemical structures can cause similar olfactory qualities. One could also imagine accuracy conditions that mention the perceiver's learning, biology or other physiological and psychological factors that, as Barwich explains, affect olfactory perception.

Using the latter sort of accuracy conditions would be an acknowledgement of Barwich's point that the molecular chemistry is insufficient to explain our olfactory experiences; one also needs to appeal to physiological and psychological processes to explain them. It seems like Barwich thinks such appeal cannot be part of the representational approach's explanations. That is why the need for such appeal tells against the approach, she seems to think. Let me present two examples Barwich uses to create trouble for the approach in this regard, before turning to the more overall issue of why the representational approach cannot appeal to psychology and physiology in its explanations.

1.2 *The importance of physiology and psychology*

A first example concerns ‘olfactory white’. Olfactory white is a distinct olfactory quality that we experience when encountering thirty or more different molecules mixed in equal intensity. Barwich writes that the quality is a ‘computational feature created by the coding system’, or, more specifically: ‘The brain creates the perceptual quality of olfactory white when it is forced to cope with an overflow of physical stimulus information’ and ‘does not know what else to do’ (Barwich 2020: 107). The example is clearly intended to tell against the representational approach. The question is why the ‘creation’ of olfactory white is something the approach cannot accommodate.

A second example concerns that very similar molecules may smell very differently. In fact, the same molecule may smell very differently in different concentrations, as Barwich mentions that 2-methyl iso-borneol does; it smells like camphor in concentrated form and earthy when diluted. An explanation of this is offered: the molecular structure looks like camphor from one angle and geosmin from another, where geosmin is a molecule that has an odour threshold one thousand times lower than camphor. So, when the concentration is high, it smells like camphor. Again, the question is why the representational approach cannot accommodate this explanation.

Contrary to what Barwich intends, the latter example’s explanation of the concentration effect might seem to be precisely the kind of explanation in terms of molecular structure that a representational approach would provide. In fact, Young appeals to such examples of so-called enantiomers as ‘the most straightforward evidence’ for the central tenet of his Molecular Structure Theory (Young 2016: 527). By contrast, Barwich’s conclusion from this example is that ‘[e]xplanations about stability and variation in odor perception . . . require an understanding of the sensory mechanisms, such as binding behaviour, not the isolated stimulus’ (Barwich 2020: 112).

I believe her thought when coming to this conclusion is that facts about odour threshold, which are appealed to in the explanation concerning 2-methyl iso-borneol, are facts about sensory mechanisms. The representational approach cannot accommodate such facts, she seems to think. Correspondingly, I believe she thinks that the ‘creation’ of olfactory white is due to sensory processing, which representational approaches cannot accommodate. My question is why not. What is it about her opponent’s view – the view that our mental life is a representational expression of physical structures – that precludes facts about sensory mechanisms or processing from being part of its explanations?

The answer cannot be that mental life being a representational expression of physical structures involves that mental life ‘relates to external features in the world’ (Barwich 2020: 88). For Barwich herself holds that olfaction ‘tells us something about the world – something about people, places, and materials’ (81), and this, she must think, does not preclude her from holding, as she does, that also physiological and psychological factors can figure in explanations of our olfactory experiences. Perhaps Barwich’s point is not that representational approaches are precluded in principle from allowing such explanations. The point might simply be that these approaches never or seldom in fact – as a historical coincidence – mention such factors when explaining olfaction. But then it is hard to understand why Barwich condemns these approaches in such strong terms. She claims that representational approaches are ‘doomed to fail’ (Barwich 2020: 11) and that Youngs’s view ‘won’t help you to understand olfaction’

(Barwich 2020: 105). This makes it sound like representational approaches unavoidably make some mistake. Which mistake is that?

1.3 A mistake about what is fundamental in explanation?

One guess would be that the mistake concerns what is regarded as *fundamental* in explanations of olfactory content. At the end of her discussion of the examples that create trouble for representational approaches, Barwich summarizes their mistake as follows:

Talking about odor objects as a stimulus representation is deceptive because it covers up the *fundamental* processes, biological and cognitive, that determine why odorants smell the way they do. Biology and psychology are the factors that resolve how physical information is organised into odor categories. You cannot black-box the processes of perceptual coding. (Barwich 2020: 115, my emphasis)

In this passage, the mistake of a representational approach is not to take molecular chemistry to matter to what olfactory experience is like, but to ‘cover up’ what is fundamental to determining this. But what is it about the idea that ‘truthful perception is an accurate mental representation of physical properties’ (Barwich 2020: 310) that covers up the fundamental processes, and in what sense are they fundamental? If being fundamental here simply means being a necessary part of an account of olfactory experience, more than one thing can be fundamental. In particular, *both* the chemistry and the biology could be fundamental. So, even if it were a commitment of the representational approach to focus on the chemistry in its explanations (which I am not sure it is), it would be unclear why the approach covers up the biology and psychology in its explanations.

I think it is hard to identify what precisely the mistake of representational approaches is, according to Barwich. What is clear is that she takes examples like those I have rendered to count against the approach. Also this is not necessarily straightforward. To the extent that the descriptions of the empirical examples is the basis for her rejection of the approach, the descriptions better not crystallize how some empirical researchers simply happen to describe the examples – for example that the brain ‘creates’ smells. Crystallizing such habits or assumptions is not an argument for rejecting alternative assumptions. For instance, in the explanation of the concentration effect for 2-methyl iso-borneol, one can emphasize the chemistry or the odour thresholds as key; both are mentioned in the explanation. So, why should we think, as Barwich does, that the sensory processing is key, and not think, as Young does, that the chemistry is?

The possibility of alternative descriptions of particular examples is, however, perhaps less of an issue if we focus on Barwich’s overall endeavour in her book. I think the sheer multitude and variety of examples she accounts for in terms of biology and psychology (I have not come anywhere close to mentioning all of them) is meant to convince us that, taken together, they show us something general about how olfaction works. It convinces me. Still, exactly how her outlook conflicts with the representational approach and why that approach is precluded from appealing to physiological and psychological processes in its explanations, remains unclear.

2. Barwich's view of olfaction

On Barwich's view, olfactory perception is not a matter of mapping or representing the environment, but of 'measuring' and actively interpreting it. Smelling is a skill used in decision-making, aimed at refining the variable 'informational content' of 'odour situations'. Smelling is not 'subjective', although it is highly idiosyncratic, varying with an individual's biology and learning. Her view of olfaction leads Barwich to draw conclusions about perception generally as well, for instance that perception is not direct (Barwich 2020: 298) and that perception and cognition are not 'entirely separate modules' (Barwich 2020: 289). Parts of her view is hard to get a grip on, because central terms like 'measurement' and 'odour situation' are not defined, except to some extent interdependently. I cannot do full justice to her view here, but I will focus on how she thinks olfaction is interoceptive, what it means that the brain 'creates scents', and raise an issue with taking it to follow that what subjects experience is created as well.

2.1 Olfaction as interoceptive

One controversy in the philosophy of olfaction concerns whether olfaction is an *exteroceptive* or an *interoceptive* sense. The issue is whether olfaction lets us experience something that is – or, alternatively, that seems – external to, or independent of, the body (as many think vision does) or something internal to, or not independent of, the body (as many think pain does). Barwich has an original approach to this controversy. She declares that olfaction is both exteroceptive and interoceptive: it is 'a sense directed at phenomena outside and inside the observer' (Barwich 2020: 82). As an example, she mentions that when smelling food aromas olfaction is, on the one hand, directed at the edibility and quality of a dish and, on the other hand, directed at 'whether you are . . . desperate enough to eat ramen noodles for the third time in a day' (Barwich 2020). What I find difficult to understand is how this claim and this example are supported by her view. I will focus on her claim that olfaction is interoceptive by asking: How does Barwich's account of how olfaction works have the consequence that olfaction is directed at something inside the observer?

When introducing the idea that olfaction is interoceptive, it is explicated as the idea that 'olfaction constitutes an inward reflection regarding the relative value assigned to this information [about things in the world outside the observer]' (82). The general idea seems to be that something from outside – information or a 'signal' – is 'inwardly reflected' or, as she elsewhere says, 'interpreted' by (e.g. Barwich 2020: 114–16) or 'dependent' on (e.g. Barwich 2020: 130) processes in the sensory system. This idea is supported by empirical evidence that, for instance, our olfactory experiences depend on context, such as visual presentation (Barwich 2020: 96), labelling of the smell (Barwich 2020: 264–66) and culture (Barwich 2020: 131). However, the idea about dependence or inward reflection and the empirical evidence mentioned is not specific enough to support the claim that olfaction is interoceptive. For it is consistent with the idea that our olfactory experiences are directed *only* at phenomena outside the observer that information from outside is interpreted by the sensory system, in the sense that the processing of it varies with context. Although different individuals in different contexts may process and experience the same molecules differently, the object of their experience – what their experience is directed at – may nevertheless be something outside them.

However, Barwich sometimes couples her ideas about interpretation and dependence with an idea that the brain *makes* or *creates* something for us to experience. For instance:

what that information [in the external world] entails, including what actions and conceptualizations it affords, *depends* on the evaluative dimensions, principles and connections embodied by the coding system – in short, how the sensory system *makes* scents of stimulus information. (Barwich 2020: 298–99, my emphasis)

Exploring what is meant by ‘creating’ or ‘making’ scents may lead to an understanding of how olfaction is interoceptive on Barwich’s view. For if either the created scents themselves or the processes that create them are in some sense inside the observer, they may constitute the inner phenomena Barwich refers to when claiming that olfaction is ‘a sense directed at phenomena . . . inside the observer’.

2.2 *What does it mean to say that the brain creates scents?*

From the quotation in the previous paragraph, we can see that Barwich thinks there are processes in the brain – processes of creation – that make scents or olfactory qualities, that is things that subjects experience, come into being. What remains hard to understand is what it means for processes in the brain or the sensory system to *create* scents. I take it that not just any sensory processing results in creation of experienced qualities. If so, talk of creation is quite empty and uncontroversial; it simply means processing. Most will agree that sensory processing happens in olfaction, as well as in other sense modalities. But Barwich clearly means to assert something substantial and perhaps even new when claiming that the sensory system or the brain creates scents. This also seemed to be her intention with the example from §1.2. about olfactory white as a created olfactory quality that representational approaches cannot accommodate. So, what must the sensory processing be like in order to create scents?

My understanding is that Barwich’s answer lies in her ideas about how the information from outside gets ‘scrambled’ in the olfactory sensory system. The scrambling happens both in the bulb and in the transition from the bulb to the piriform cortex. In the bulb, two mechanisms are responsible for scrambling the signal. ‘Combinatorial coding’ is the name for the mechanism by which (i) one receptor responds to different chemical features for different molecules and (ii) different receptors respond to the same molecule but to different chemical features of it. ‘Inhibition’ is the name for the mechanism by which some chemical features can block others so that the receptor does not respond (as it otherwise would).

One can well understand, as Barwich points out, that these mechanisms have the consequence that the receptor response to a mixture of molecules can differ from the response to the individual molecules it consists of (Barwich 2020: 188) and that different mixtures can generate the same receptor pattern (Barwich 2020: 190). But it remains obscure, to me at least, why it means that ‘[t]he brain represents what it is shown by the receptors’ and ‘does not “see” the configuration of external odorants but deals only with signals from the epithelium’ (Barwich 2020: 186). That the receptor mechanisms *influence* whether or in what way information from one molecule is passed on in the olfactory sensory system need not mean that the brain’s access to what the information originates from (the external odorants) is blocked altogether. However,

perhaps this influence could suffice for explaining how the sensory system creates scents (although not *ex nihilo*)? It could, but it could also merely count as contextual disambiguation or completion of the information from molecules, which are processes Barwich thinks matter in olfactory processing too. The issue here can be considered part of the larger issue of how to delineate constitutive from causally effective factors in olfaction. As Smith points out in his discussion of flavour, empirical enquiry alone cannot settle this delineation; philosophical or theoretical principles are needed in addition (Smith 2015: 337–39). Analogously, in the case at hand, we lack theoretical principles for deciding whether the receptor mechanisms merely causally effect the information from molecules and, in this way, the scent we experience by contextually disambiguating it, or if they also contribute something that is constitutive of the scent and in this sense creates it.

The same issue concerning creation versus contextualization also arises for the scrambling that Barwich describes as taking place in the transition from the bulb to the piriform cortex. There, the signal from one glomeruli in the bulb (spherical neural structures in the outer layer of the bulb) is sometimes *scattered* to different areas of the piriform cortex and sometimes *converge* with signals from other glomeruli to the same area (Barwich 2020: 248). When an individual over time is presented with the same molecules repeatedly, the brain's response to these scrambled signals in the piriform cortex gets stronger and more specific. In this way, 'the piriform creates temporary anticipatory odor templates' (Barwich 2020: 261), Barwich concludes.

I think we can grant Barwich that these odour templates can be regarded as a tool developing in the brain, or as a tool the brain creates (if using the word 'creates' similarly to how one might say that the wind creates ripples on water). But while the tool itself is created, what it does to the neural signal need not therefore be creation, nor need it create scents. The brain's response to the neural signal in accordance with past experience might simply count as context to the interpretation of the signal, but not as creation, in so far as creation means making something that was not there before.

In summary, I think more needs to be said in order to establish that the scrambling Barwich describes results in creation. However, even if the neural signal is in some sense and to some extent created by the brain, it is unclear why this will mean that the scent or the odour *subjects* experience is created as well. But that is what Barwich claims: 'Odors are a creation of your brain' (Barwich 2020: 299) and '[t]he structure of phenomenological experience, what it's like to perceive the world, is not independent from the neural architecture that creates it' (Barwich 2020: 263). So, part of her claim is that the neural architecture or the brain creates the phenomenology or the odours that subjects experience.

2.3 Concluding from brain processing to phenomenology

The latter point raises a more overall question about what the relevance of brain processing is for phenomenology and perceptual experience. Even apart from her claims about how scrambling of the information from outside leads to creation, Barwich seems to think that the scrambling has consequences for what a subject experiences. As part of the summary of her view in the final chapter of the book, she writes:

This smorgasbord of physical information [sensory input from various sources] is translated into neural signals, and then processed throughout various stages during which this information is filtered, structured into signaling chunks, and integrated

into clusters, as well as further aligned with other, parallel processes in the nervous system.

Accordingly, the perceptual content of smell *must* be analyzed not primarily as instances of ‘odor objects,’ but concerning ‘odor situations.’ Odor situations represent a perceptual measure of neural decision-making in context, where input cues are integrated in terms of their temporal and learned associations. (Barwich 2020: 306, my emphasis)

Exactly what ‘odour objects’, ‘a perceptual measure’ and ‘odour situations’ are is not essential for my purposes and is unfortunately not defined. However, while it is hard to get a grip on exactly what Barwich concludes *is* the perceptual content of smell in the quotation, the words ‘accordingly’ and ‘must’ indicate that she concludes about this from her description of the translation, filtering etc. of the information coming from outside. I find this conclusion from brain processing to what the subject experiences intriguing.

Not just in olfaction research, but with regard to perception generally, there is a gap to be bridged between empirical science’s talk of what the brain does and philosophy’s talk of what the subject experiences. As Drayson (2021: 229) observes, it is not given that such subpersonal-level and personal-level talk are independent from one another in any interesting sense. She suggests, in fact, that such talk may be addressing the same metaphysical questions, but at different levels of explanation. If this is right, Barwich may well be right that empirical knowledge about how information is processed in the brain allows us to draw conclusions about what a subject experiences. The unanswered question, however, is how exactly these conclusions are to be drawn. How do we transition from findings or theories about brain processing to conclusions about phenomenology and experience? In particular, in the case at hand: What must we assume if the translation, filtering etc. of sensory information that Barwich describes is to have the consequence that the perceptual content of smell is ‘odour situations’?

Such questions remain unanswered in Barwich’s book. She draws conclusions from sensory processing to a subject’s experience, without detailing how these conclusions are reached, for instance in the quotation above. Perhaps one will say that I am here asking for details where none is needed. None is needed, one might think, because the information from outside, which gets processed in the sensory system, is *identical* to the perceptual content that the subject experiences. The idea would be that what the subject experiences simply is the input to the sensory system, modified by the changes or additions that the system makes to it. So, if the brain creates a template as a tool for modifying the neural signal in the brain, this template also modifies what the subject experiences.

A problem for this idea arises if one thinks there are modifications happening in the sensory system that do not have exactly the same effect on what we experience as it has on the information that gets processed. For instance, I mentioned above that Barwich describes how the signals from the bulb to the piriform cortex are sometimes scattered and sometimes converge. The effect on the signal is ‘scrambling’. But is what the subject experiences also scrambled *the same way*? If the answer is ‘yes’, this can help identify a sense in which olfaction is interoceptive: it is partly directed at the effect of a process inside the body, which one might think is itself something inside the body. But an affirmative answer also involves making a claim about our experience that I think needs to be related to something recognizable about it – a way in which what we experience is scrambled – if it is to seem plausible. If the answer is ‘no’, then there are interpretive choices to be made about what the modifications of the signal in the

sensory system mean for the subject's experience. This would bring back the same issue as before: what assumptions should we make in order to draw conclusions from sensory processing to perceptual experience and phenomenology?

I do not think this issue is avoided by subscribing to the mentioned idea about identity between perceptual content and input information. This idea is an assumption about how to draw conclusions from sensory processing to perceptual content. But it is not, as far as I can tell, a neutral or default assumption. Even if it should be the case that sensory processing has a creative effect on the information it handles and that what we experience in olfaction is created as well, it is not given that the information is identical to what we experience. The sensory processing's effect on the information could, for instance, explain why we experience something created, without that information *being* what is experienced. Thus, I think that when drawing conclusions from sensory processing to perceptual content, this will involve making assumptions that need to be made explicit if we are to understand how the conclusions follow.

3. Conclusion

While I think there are certain aspects of Barwich's claims and arguments that could be clearer, there is much about her view that is philosophically interesting and insightful. The idea that the brain creates scents and that olfaction in this sense is interoceptive, seems to suggest that part of what is smelled is something about oneself. Still, as Barwich emphasizes, since a created scent results from the processes of the sensory system, experiencing it is an experience of something objective, even if it is idiosyncratic and dependent on something inside the observer (see [Smith 2015](#) for a similar idea about objectivity). Another lesson from Barwich's book is, I think, that olfaction is not a sense that just reports on what is around in our environment, but more centrally a sense for judging what is good for the organism given the state it is in. These insights do not require succeeding in rejecting the representational approach and, thus, can bypass the reservations I have expressed above about that. If one is willing to leave unspecified and intuitive what it means to create scents, my quibbles about this notion may also be disregarded. However, what I think presents a substantial unaddressed issue in Barwich's book is the final point above about how empirical results have consequences for a subject's experience. She offers 'a framework in which molecular science meets perception' ([Barwich 2020](#): 263). A clearer specification of exactly what the premisses for that meeting are is something I think her view and further work in the paradigm she outlines would benefit from.²

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The Philosophical Ibsen

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Kristin Gjesdal's *The Drama of History: Ibsen, Hegel, Nietzsche* is a rich exploration of Hegelian and Nietzschean themes in and through Ibsen's work. Ibsen (1828–1906) was born shortly before Hegel's death (1831) and was a contemporary of Nietzsche (1844–1900).¹ Some of Ibsen's best-known plays – *A Doll's House*, *Ghosts*, *The Wild Duck* – premiered during Nietzsche's most active period of philosophical writing. Gjesdal's book is also a window onto Hegel's and Nietzsche's 19th-century reception in Scandinavia, and their place in literary and artistic circles. That said, Gjesdal's book is not just about charting influence. This makes the study especially interesting and philosophically rich. It asks 'what hermeneutic-artistic possibilities were disclosed by the philosophical contributions at the time and how Ibsen, as an artist, makes use of and often goes beyond them' (3). Gjesdal reads the plays as taking up Hegelian and Nietzschean themes, yet complicating and challenging them, in such a way as not only to have Hegel and Nietzsche shed light on Ibsen but also to have Ibsen shed light on Hegel and Nietzsche.

Two of the plays Gjesdal discusses will be less familiar to most audiences: *The Vikings at Helgeland* (1858) and *Emperor and Galilean* (1873), both works treating historical themes. It is Ibsen's bourgeois dramas, set in the Norway of roughly his time, that tend to be the popular stage mainstays now. The folkloric *Peer Gynt* (1867) is likely somewhere in between, in terms of familiarity.

The Vikings at Helgeland takes place in the 10th century and draws, as its name would suggest, on the Saga literature. The 19th century was a period of great interest in mythology, with this thought to be a route to better understand and make sense of one's identity and of the values that ground one's community. During the same period as Ibsen was writing, Richard Wagner was at work on his monumental tetralogy, *Der*

1 Kristin Gjesdal, *The Drama of History: Ibsen, Hegel, Nietzsche*, New York: Oxford University Press, 2020, xiii + 219 pp.