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PRESS RELEASE

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The scent of wood – How wood odours influence indoor air quality

How people evaluate odours does not depend entirely on the odorant itself. Context influences perception. A research team from the Leibniz Research Centre for Working Environment and Human Factors (IfADo) has worked with researchers from the Thuenen Institute of Wood Research in Hamburg to investigate that wood odours are rated as significantly more pleasant when accompanied by a corresponding image of wood. The results of two recently published studies suggest that the health benefits of current regulated odour assessments of building products are questionable.

Wood is in vogue: it is more sustainable than concrete or steel and brings warmth and naturalness to living spaces. However, anyone who uses wood in interior design is bringing a building product with its own odour into their home. This is because organic materials emit volatile organic compounds (VOCs) and odours that can impact indoor air quality. To ensure healthy indoor air, building products can be subjected to a sensory odour test in accordance with DIN ISO 16000-28:2021, in which the odorous substances are presented and evaluated.

Researchers from IfADo led by Prof. Dr. Christoph van Thriel and researchers from the Thuenen Institute of Wood Research have investigated this in more detail in the ‘Wood for good’ project: How do people perceive the odour of different wood materials – and how does the image of the associated material influence this rating?

Odours in your head – not just in your nose

In the first study, 32 people were presented with various wood odours in a standardised smell test – followed DIN ISO 16000-28:2021 – including pine, oak and wood-based materials such as coarse chipboard made from poplar or pine. Some samples were shown with an image of the corresponding wood material, others without. The intensity, pleasantness and familiarity of the odour were evaluated.

The visual context played a decisive role: when the corresponding image of the material was shown, the test subjects rated the smell as more pleasant and familiar. Smells rich in terpenes, such as the scent of pine wood, were rated particularly positively. Smells with a higher proportion of acetic acid or aldehydes, typical of oak or some wood-based materials, were perceived as less pleasant. The intensity of the smell had no influence on how pleasant or familiar it was perceived to be.

Without a picture, it was harder for participants to identify the smell, which lowered their ratings. When there was a picture that matched the smell, i.e. when it was clear that the scent came from wood, the smell was rated more positively.

Images alter odour perception

Viviane Gallus, from the IfADo research group Neurotoxicology and Chemosensation, investigated how odour stimuli are processed in the visual area of the brain. She presented 21 test subjects with the smell of pine wood or clean air accompanied by images of wooden walls or floors, or walls (such as stone walls or plaster).

Vision had a major influence on whether the smell was perceived as pleasant: the wood images generally made the smell more pleasant. It was less relevant whether the smell of pine wood or 'normal' room air was perceived by the nose. The smell was rated as most pleasant when the wood image and the wood smell matched, but only with a slight effect.

To rule out the possibility that the effects simply reflect the simultaneous processing of visual and olfactory stimuli, the experiment was also conducted with a citrus scent.

The measured changes in brain activity suggest that conceptually relevant images are automatically processed as particularly important, even when the actual task was to evaluate the odour and not the visual appearance.

Odour ≠ health risk

Just because a smell is strong or unfamiliar does not automatically mean that it is harmful to health. As long as legal guidelines for individual VOCs are complied with, no adverse health effects are to be expected.

Based on the results, the researchers recommend that the actual VOC concentrations should be the focus of indoor air quality assessments for health purposes. In light of the study results, adding an odour test in its current form does not provide any additional health benefits. The experiments indicate that odour assessments – as currently provided for in standards or environmental labels – are easily influenced and do not reflect the effect of odours. Since odours are very rarely processed without their visual context, this should also be taken into account in standardised odour tests as part of certification or approval procedures.

These findings are of practical relevance for every building owner: in buildings where wood is used, it may be advisable to leave wooden elements visible, especially if the user has a positive perception of wood – for example, by exposing ceiling beams or using wood panelling. This could have positive effects on the subjective perception of indoor air and general well-being.

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Original publications:

Butter, K., Hucke, C.I., Ohlmeyer, M., van Thriel, C., 2025. *The impact of visual context on the perception of wood odours.* Building and Environment 113129. https://doi.org/10.1016/j.buildenv.2025.113129

Gallus, V., Hucke, CI., Butter, K., Ohlmeyer, M., van Thriel, C.: *Conceptual processing of natural, complex odours: multisensory effects on behaviour and ERSP*. Brain Res (2025) https://doi.org/10.1016/j.brainres.2025.149839

Visual stimuli influence the sense of smell. Experiments were conducted to compare how the smell of wood is perceived when images of wood, other building materials or no images at all are shown at the same time.

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