

The signature of taste: New technology for the food and beverage industry

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Pot stills, which are usually formed from copper, are used to distil spirits such as whisky. Credit: Slyrs / Julia Schmidt

Blending whiskies from different casks is an art in itself. Whisky blenders are luminaries of their guild. Just as painters mix colors to

capture mood on canvas, the experts in distilleries combine flavors to create "liquid gold." They follow their intuition, which is based on experience and a keen sense of taste and smell.

Although numerous scents and flavors can be measured, the technical capture of a diverse [taste](#)—like that of [whisky](#)—is not possible today. The start-up "Harmonize," which is based at the Max Planck Institute of Biochemistry in Martinsried, aims to close this gap and bring a new technology for the beverage and [food industry](#) to application maturity. "The goal here is not to replace [human performance](#), but to provide industry with a tool to optimize taste, ensure quality or develop novel products," says Christoph Wichmann, physicist and managing director of the young team.

Taste is individual

The taste of whisky is determined by many factors: on the one hand, there is the barley and the water used, the basic products of the Scottish national drink. But the type of malting, the distillation process and the casks used also play a decisive role in determining whether a whisky tastes good or not. While some people prefer a peaty aroma, others appreciate a fruity note, for example.

The number and combination of molecules that dock onto the chemoreceptors in the mouth and nose and thus influence the sensation of taste are not exactly known; it is estimated to be several hundred thousand. To make them measurable, the "Harmonize" team, consisting of three scientists and a product manager, uses technologies they are familiar with from their research: [mass spectrometry](#) and [artificial intelligence](#).

The mass spectrum helps them to determine the mass of molecules with a known charge. "It doesn't matter what the molecules are specifically,

but rather the unique signature of the whisky," says Hamid Hamzeiy, who is responsible for data processing and analysis. A new software tool that uses artificial intelligence methods will help to quantify the molecules.

A whisky that keeps its promise

Bioinformatician Hamid Hamzeiy had the idea of using whisky as a proof-of-principle at a symposium in Scotland. Together with Daniil Pokrovsky, he had bought an expensive bottle of whisky. "Despite the high price, we were disappointed with the taste," says Pokrovsky. "An expensive product should also deliver what it promises."

To get closer to this goal, the "Harmonize" team works closely with the largest German whisky producer, who provides them with the samples for their measurements. "All these samples, which are matured in different barrels, have about 55 to 60 percent alcohol content," says Hans Kemenater, the managing director of the Slyrs Distillery. With 3,500 barrels, all of which have their own characteristics, he hopes to get ideas about which whiskies can be blended to ensure consistent quality.

Christoph Wichmann, Hamid Hamzeiy, Daniil Pokrovsky and Paulyna Mendoza Quintero want to use whisky to prove that their technology works. In the medium term, they plan to expand the business to other beverages and foodstuffs. "We are convinced that there is very great potential for this," says marketing expert Mendoza Quintero.

The team is aware that it is also taking a risk. But they know what they are getting into. "The freedom to break new ground appeals to me," says Christoph Wichmann. Daniil Pokrovsky also sees it that way. After his postdoc, he had good offers from academia and industry. However, he decided to take the self-employed route. But yes, "I am damn scared," says the young scientist. The team, however, gives him security, he says.

"A good network of supporters is an important guarantee for success," says Christoph Wichmann. For example, "Harmonize" is advised by Max Planck Innovation and the Max Planck Foundation. Jürgen Cox from the Max Planck Institute of Biochemistry is a scientific mentor, and experts from the whisky industry are helping with market entry. Since September 2021, the "Harmonize" team has been funded via the Exist research transfer, a welcome success that gives them planning security for the first time.

Provided by Max Planck Society

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