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## Thinking outside the booth: when Covid-19 pushed sensory testing to remote options

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### ABSTRACT

This commentary addresses the issue of remote testing with sensory and consumer panels, within the VSI Covid-19 and Sensory Science in Food Quality and preference. In particular, two papers on the topic will be discussed: Dinnella et al. "Remote testing: Sensory test during Covid-19 pandemic and beyond" and Han Seok et al. "Stay safe in your vehicle: Drive-in booths can be an alternative to indoor booths for laboratory sensory testing". At the time of writing this piece, the pandemic has been among us for two years, highlighting the fact that remote testing strategies are more needed than ever. Testing methods should be developed, compared, validated and optimized, so sensory practitioners are prepared and can have an informed methodological choice when their projects are pushed "outside the sensory booth".

### 1. Introduction

The SARS-CoV-2 outbreak from December 2019, declared as pandemic in March 2020 (also known as COVID-19, used in this paper), determined changes in lifestyle, working conditions, social interactions, and food-related behavior for millions of citizens in the world. COVID pandemic affected industrial chains at various levels, food among those, even to the limit of destabilizing markets and economies (Gomez-Corona et al., 2021). Measures taken by the different governments varied in strength and came in the form of partial and total lock downs, with work from home policies. These measures affected food routines, consumption volume and patterns, even to the point of shifting preferences and reasons underlying food choices (Laguna et al., 2020; Hodbod et al., 2021). Changes in food behavior have been various, from the rise of indulgent food consumption (Laguna et al., 2020) to the stockpiling of basic items (Wang et al., 2020); those are not the main objective of this commentary, however, some behavioral changes are indeed relevant, like those changes mediated by food-related fear (Gomez-Corona et al., 2021) and risk perception of being contaminated by food items (Kitz et al., 2021), and will be discussed below.

Lockdowns and work from home policies affected sensory and consumer testing at large, with reduced to no possibilities to run tests in the sensory lab. Consumer testing at home had been done for a long time before the pandemic, with proved success, applied through various approaches like qualitative and quantitative testing, and supporting product development (Pound et al., 2000). Remote testing vs lab-based

testing entails a tradeoff between context relevance/ecological validity and full control of the experiment, in the case of consumer-based data collection, with several advantages (Meiselman, 2013). Several researchers highlighted the added value of testing in context with further ecological validity (Zandstra & Lion, 2019), for the interested reader there are three very complete reviews on that matter (see Boutrolle & Delarue, 2009; Delarue & Boutrolle, 2010; Jaeger and Porcherot, 2017). However, this has not been thoroughly studied in the case of trained sensory panels and analytical techniques, and in the case of trained panels, getting outside the booth comes out of necessity, and before COVID-19, the examples or remote analytical sensory testing were very few.

### 2. Covid-19 and remote consumer testing

Consumer testing is part of the sensory toolbox for research and development in the industry and academia, and access to consumers was largely hindered by COVID-19. As potential solution for accessing consumers during lockdowns or partial lockdowns, Seo et al. (2021) compared drive-in booths (consumers tasting from their own vehicle) with laboratory sensory booths, in terms of sensory and emotional responses, engagement with the test, and risk perception of getting COVID-19 virus during the sensory evaluation. Results towards the tested samples (commercially-available beverage products) were comparable between the testing environments, and the responses to the test were in line with previous research, where lab-based testing resulted in

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more focused, controlled evaluation, while the drive-in version was further perceived as a “real-life” experience. The authors discuss some reasons for the lack of significance between the lab-based and drive-in booth conditions in sensory or emotional responses to the four tested beverages, many in line with some previous research (see Seok’s paper for a complete overview). However, another potential reason, could be the fact the samples presented in the study were very different in sensory characteristics (unsweetened black tea, coconut water, lemonade, and vegetable juice), obtaining very different ratings, which could explain the fact that results were well repeatable/not significantly different between environments, with the added fact that there were the same consumers tasting the samples in the two conditions with only a short break (20-min). Thus, these results could in principle not be generalized to other samples and categories, and more research would be needed with samples in closer type and sensory profiles.

Regarding the relevance for the COVID-19 situation, the study of the potential effects of test condition on feeling less risk of COVID-19 seems of great interest, with more than half of the participants having a lower feeling of risk from the virus in the drive-in booth condition than in the laboratory one, what could be a good option for practitioners. That been said, with the comparison done on the same day, with the same people, it does not inform about the influence of the drive-in setting as compared to lab-based in “normal” conditions (no pandemic), or if the fact of being served food samples in a pandemic could contribute to more anxiety in consumers with potential effect on the results. These points seem of interest in a situation where there was no choice of performing sensory testing in the lab (lockdown) and would be interesting to tackle by further research.

On a different perspective, [Dinnella et al. \(2022\)](#) explored consumer testing procedures, with a between-subjects design, in remote conditions (home based) during the pandemic as compared to lab conditions in times before the pandemic (2018). Their design considers both Check-All-That-Apply (CATA) and hedonic evaluations. In the case of the CATA responses, main general conclusions were comparable, but some differences were encountered between test conditions in terms of sensory description (see Dinella et al. for details), this is not surprising given the fact that commercial products manufactured in 2018 and 2020 were utilised which are expected to be different because of changes in formulations or ingredients, added to this, consumers were different in both settings. The authors found that discrimination among samples appeared slightly better in lab than in remote (at home) conditions. While this could be a result of the more analytical set up of the lab, previous literature suggest there is no consistent evidence of superiority of product discrimination when comparing in-home use and lab settings ([Jaeger and Porcherot, 2017](#)). However, there was a lack of significant effect of condition (lab vs RT-H) on liking which the authors discuss it may support the hypothesis that the controlled methodology used in this study for performing the test at home makes the context more similar to laboratory conditions than to a home use test.

### 3. Covid-19 and the sensory trained panel work

The pandemic has also hindered normal operation of sensory trained panels in a “work-from-home” recommended or mandatory situation. Live testing with a panel leader from a remote location like home, as proposed by Dinella et al. (2021) could be a good solution to retain the control of the test required, when working with trained panels performing analytical sensory testing. The authors assess the effectiveness and validity of remote tests (at home or at work) as compared to lab-based evaluations, with trained panels, including discrimination testing (triangle and tetrad), Descriptive Analysis and Temporal Dominance of Sensations. They showed that remote sensory testing presented highly similar results to the lab testing, with the exception of the tetrad test. In this sense, the authors hypothesize environmental noises may hinder sample discrimination in remote conditions. Because of this, they suggest to practitioners remote testing at home rather than in the offices

to ensure a better control of the procedures. This makes sense, because of the lower possibilities of control of odors, sounds, etc. in an office environment, which could lead to bias and decrease of attention, and the potentially less “analytical mode” of assessors as compared to the sensory lab. Dinnella’s paper has a careful design of experiment, and well discussed findings and recommendations for practitioners, highlighting the importance of a detailed protocol when carrying out testing with trained panels outside of the sensory lab. The guidelines recommended by these authors are a first step towards the standardization of remote testing procedures. Added to this, they propose further studies to look more in-depth at factors affecting the sensitivity of sensory tests performed in remote conditions.

Sensory trained panels are often seen as calibrated “machines”, but they can also be seen as “trained consumers” ([Meiselman, 2013](#)), and as such, with their “consumer hat” they may be also influenced by the pandemic effects with regards to food consumption and food behavior. In that sense, the potential risk or fear associated to food products consumption may become important also when acting as sensory panelists, associated to analytical samples, so safety-related measures needs to be carefully ensured and well communicated by the panel leader, to avoid undesired effects in the results, and increase the confidence of tasters with regards to remote testing.

### 4. Conclusions and remaining challenges

The consistency of the sensory and consumer testing results between lab and remote conditions in the two papers here discussed is very promising, in a still uncertain future in which the COVID-19 pandemic is still ongoing, and even after that, in a “new normal” working environment where more people would be expected to work from home. Furthermore, remote testing procedures could have further applications, like running multicountry studies, or testing in remote areas within the same country or in places when a sensory lab is not accessible.

Remaining challenge is to continue “thinking outside the booth” and to validate these findings to other products sets and sensory tests, developing recommendations for practitioners that are tailor made for their objectives. It would be desirable to have remote testing international standards directed to the main types of existing sensory and consumer testing procedures.

#### *CRedit authorship contribution statement*

**Paula Varela:** Writing – review & editing.

#### **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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