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DOI
10.1093/chemse/bjac026

Publication date
2022

Document Version
Final published version

Published in
Chemical Senses

Chemical Senses, 2022, **47**, 1–2
https://doi.org/10.1093/chemse/bjac026
Advance access publication 7 November 2022
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Jan E.R. Frijters (1947–2022)

Jan Frijters was born in Eindhoven, the Netherlands in 1947. From 1967 to 1972 he studied psychology in Utrecht, where Ep Köster's classes in psychophysics and perception motivated him to continue working in the field. The work Jan performed at the Spelderholt, an agricultural poultry institute, became the basis for his PhD thesis "Psychophysical and Psychometrical Models for the Triangular Method," which he defended in Utrecht in 1980, again with Ep Köster.

Jan was intrigued by the question of how we could measure the sensations that people perceive, these internal representations that are private and cannot be observed from the outside. He built his research on classical psychophysical methods, starting with Thurstonian modeling and Signal Detection Theory. In one of his classic papers with the elusive title "The Paradox of Discriminatory Nondiscriminators Resolved," he describes how the differences in the number of correct responses between the triangular test and the 3-alternative forced choice (3-AFC) test can be explained by task differences. While the triangular test asks to pick the deviant sample, the 3-AFC procedure asks to pick the least or most intense of 3 samples. In either case, a statistical argument would suggest that P(correct) = 0.33. However, the 3-AFC task is easier because participants already know whether the target sample is more or less intense than the others. The descriptions of the cognitive decision rules underlying simple psychophysical tasks, calculating the expected response distributions, and their use in interpreting the outcomes of sensory tests have found application in sensory testing labs around the world and have formed the basis for standardized ISO testing protocols.

In 1978, Jan took up an appointment at the Agricultural University in Wageningen, where he started as staff member at the Department of Human Nutrition and in 1987 became professor in the Psychological and Sensory Aspects of Food and Nutrition at the Department of Food Science. In Wageningen, Jan was initially responsible for all psychological research relevant to human nutrition, including determinants of unhealthy behavior and eating disorders. The most cited papers he contributed to involve the development of a questionnaire to measure physical activity for epidemiological studies and a questionnaire for the assessment of restrained, emotional, and external eating behavior, but Jan was especially passionate about psychophysics.

For Jan, the question of how to measure sensory intensity was central to his work. He thereby built on classical psychophysics, starting from the determination of absolute and differential thresholds, using Fechner's law to create a cumulative JND scale, the Weber fraction, and Stevens's power law. He argued against the use of odor units as a measure of olfactory intensity, because dividing a suprathreshold concentration by the absolute threshold concentration would not provide a reliable estimate of perceived intensity according to these basic psychophysical principles. The confusion here lies in the fact that physical concentrations rather than perceived intensities of sensations are used to infer psychological relations. Despite these objections, the odor unit can serve as a guideline in particular investigations and is still widely used in applied flavor research.

Although many researchers were using direct scaling methods to measure the perceived intensity of substance concentrations, Jan doubted whether these methods really provided unbiased measurements of intensity. In particular, the fact that category rating scales and line scales provided differently shaped psychophysical functions than magnitude estimation led to a debate about which scaling method was the correct one. By using the same stimulus sets in several studies with different task instructions, Norman Anderson's Information Integration Theory could be used to separate psychophysical from judgmental processes and to test hypotheses about underlying cognitive operations. This approach enabled Jan's group to elucidate the cognitive operations underlying different direct scaling methods and obtain a validated scale of perceived intensity using intensity differences between 2 samples.

The phenomenon that Jan's group studied primarily concerned the sensory interactions in mixtures of tastants and mixtures of odorants. After assessing the intensities of the

different tastes or smells in mixed and unmixed samples, the group tried to characterize and quantify the nature of the interactions, and tested the predictions of existing mixture models. Jan made a special contribution in this area by proposing the equiratio mixture model, which predicts the perceived intensities for series of samples with a specific mixing ratio and also involves a radically different way of looking at mixtures.

Although he withdrew from the public eye in 1992, Jan continued to work in the field of sensory perception. Being a heavy smoker himself, he went to work for the Brown and Williamson Tobacco company. With International Flavors & Fragrances (IFF), he set up their perfumer training program and worked on the IFF flavor language. In the Netherlands, he also contributed his expertise in legal processes, by critically evaluating and proposing improvements for dog scent lineups in criminal cases. This work had a major local impact: nearly 2,000 lawsuits had to reopened and in 144 cases this led to an acquittal. In addition, 9 police officers were prosecuted for malpractice during odor identification tests.

With the passing of Jan on 2022 May 16, we lose a high-quality, passionate researcher and teacher in the field of chemosensory psychophysics. While a focus on research methodology may not be the most exciting or popular topic, methods provide the tools by which we build science. By solving some of the apparent paradoxes in the field, Jan provided fundamental knowledge about the mechanisms at work when participants use particular response methods. We build on his legacy as we study phenomena of interest in the field of chemosensory perception.

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