Modeling individual differences in perceptual decision making /

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Monografía

To deal with the abundant amount of information in the environment in order to achieve our goals, human beings adopt a strategy to accumulate some information and filter out other information to ultimately make decisions. Since the development of cognitive science in the 1960s, researchers have been interested in understanding how human beings process and accumulate information for decision-making. Researchers have conducted extensive behavioral studies and applied a wide range of modeling tools to study human behavior in simple-detection tasks and two-choice decision tasks (e.g., discrimination, classification). In general, researchers often assume that the manner in which information is processed for decision-making is invariant across individuals given a particular experimental context. Independent variables, including speed-accuracy instructions, stimulus properties (i.e., intensity), and characteristics of the participants (i.e., aging, cognitive ability) are assumed to affect the parameters in a model (i.e., speed of information accumulation, response bias) but not the way that participants process information (e.g., the order of information processing). Given these assumptions, much modeling has been accomplished based on the grouped data, rather than the individual data. However, a growing number of studies have demonstrated that there were individual differences in the perceptual decision process. In the same task context, different groups of the participants may process information in different manners. The capacity and architecture of the decision mechanism were found to vary across individuals, implying that humans' decision strategies can vary depending on the context to maximize their performance. In this special issue, we focused on a particular subset of cognitive models, particularly accumulator models, multinomial processing trees and systems factorial technology (SFT) as applied to perceptual decision making. The motivation for the focus on perceptual decision-making is threefold. Empirical studies of perception have grown out of a history of making a large number of observations for each individual so as to achieve precise estimates of each individual's performance. This type of data, rather than a small number of observations per individual, is most amenable to achieving precision in individual-level and group-level cognitive modeling. Second, the interaction between the acquisition of perceptual information and the decisions based on that information (to the extent that those processes are distinguishable) offers rich data for scientific exploration. Finally, there is an increasing interest in the practical application of individual variation in perceptual ability, whether to inform perceptual training and expertise, or to guide personnel decisions.

Although these practical applications are beyond the scope of this issue, we hope that the research presented herein may serve as the foundation for future endeavors in that domain. To deal with the abundant amount of information in the environment in order to achieve our goals, human beings adopt a strategy to accumulate some information and filter out other information to ultimately make decisions. Since the development of cognitive science in the 1960s, researchers have been interested in understanding how human beings process and accumulate information for decision-making. Researchers have conducted extensive behavioral studies and applied a wide range of modeling tools to study human behavior in simple-detection tasks and two-choice decision tasks (e.g., discrimination, classification). In general, researchers often assume that the manner in which information is processed for decision-making is invariant across individuals given a particular experimental context. Independent variables, including speed-accuracy instructions, stimulus properties (i.e., intensity), and characteristics of the participants (i.e., aging, cognitive ability) are assumed to affect the parameters in a model (i.e., speed of information accumulation, response bias) but not the way that participants process information (e.g., the order of information processing). Given these assumptions, much modeling has been accomplished based on the grouped data, rather than the individual data. However, a growing number of studies have demonstrated that there were individual differences in the perceptual decision process. In the same task context, different groups of the participants may process information in different manners. The capacity and architecture of the decision mechanism were found to vary across individuals, implying that humans' decision strategies can vary depending on the context to maximize their performance. In this special issue, we focused on a particular subset of cognitive models, particularly accumulator models, multinomial processing trees and systems factorial technology (SFT) as applied to perceptual decision making. The motivation for the focus on perceptual decision-making is threefold. Empirical studies of perception have grown out of a history of making a large number of observations for each individual so as to achieve precise estimates of each individual's performance. This type of data, rather than a small number of observations per individual, is most amenable to achieving precision in individual-level and group-level cognitive modeling. Second, the interaction between the acquisition of perceptual information and the decisions based on that information (to the extent that those processes are distinguishable) offers rich data for scientific exploration. Finally, there is an increasing interest in the practical application of individual variation in perceptual ability, whether to inform perceptual training and expertise, or to guide personnel decisions. Although these practical applications are beyond the scope of this issue, we hope that the research presented herein may serve as the foundation for future endeavors in that domain

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