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Cellular individuality in the gradient sensing response of *Dictyostelium* AZADEH SAMADANI, JEROME METTETAL, ALEXANDER VAN OUDENAARDEN, MIT — It is generally assumed that single cells in an isogenic population exhibit the same behavior. However, it is becoming increasingly clear that even in a genetically identical population, gene expression levels can vary significantly from cell-to-cell. As a result of this variation, a physiological response such as gradient sensing might also display a significant variability from cell-to-cell. Although it is known that most cell populations are heterogeneous, the response of a typical cell or the average response of a population is often reported. However, quantitative information of cellular variability may contain important information on the intracellular signaling events. Here we explore the chemotactic response in single *Dictyostelium* cells in response to repeated spatio-temporal pulses of chemoattractant. We find that the response of a single cell is reproducible from pulse-to-pulse. In contrast, a large variability in the chemotactic response is observed from cell-to-cell even when different cells in the population are exposed to the same pulse. We propose a simple model, which allows for the broken symmetry of the chemotactic response and reproduces the cellular variability within the population fairly well.

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