Abstract View

THE TEMPORAL NEIGHBORHOOD EFFECT: THE PERCEIVED BRIGHTNESS, DURATION, AND SIZE OF A FLASH CAN BE MODIFIED BY TEMPORAL PROPERTIES OF ITS NEIGHBORS

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It is known that the perceived brightness of an object depends on spatial relationships with its neighbors (e.g., simultaneous contrast). We here examined whether the perceived brightness of a briefly flashed object depends on TEMPORAL relationships with its neighbors. Two flashes appeared separated by a fixation point: one lasted for 56 ms ('brief'), the other for 278 ms ('long'). Observers reported which flash appeared brighter. When the flashes had simultaneous onset, subjects reported that the brief flash looked dimmer than the long flash; however, when the flashes had simultaneous offset, the brief flash now appeared brighter. This is, to our knowledge, a novel illusion, which we term the Temporal Neighborhood Effect. The perceived brightness of the brief flash increased monotonically and linearly with increasing SOA. When the background was of higher luminance than the flashes, the effect was reversed. The differential effect was lost when the flashes were isoluminant with a colored background. These results suggest that the luminance of the brief flashes becomes temporally integrated with the background. Ten further experiments show that not only the brightness, but also the size and duration of a brief flash are modified by the onset and offset timings of neighbors. It seems that we are unaware of brightness changes, instead being only aware of the result of integrations over these changes. The duration of the integration window may be changed by salient events in neighboring locations in the visual scene. We propose a model for the neural substrate underlying this phenomenon.

Citation:
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