What is the ‘correct’ human cortical magnification factor?

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Scaling stimulus size by an estimate of the cortical magnification factor (CMF) is common practice in psychophysical experiments on peripheral vision. Yet what is the CMF’s correct value? There is agreement that the inverse CMF increases mostly linearly with eccentricity in the visual field, so the question can be split into two parts: What is the CMF in the retinotopic centre? And what is the correct rate of decrease towards the visual periphery? After sixty years of research since the CMF’s introduction, there is still surprising disagreement on these simple questions. Current fMRI estimates of the foveal CMF vary between 7.4 mm/° and 47.6 mm/°, i.e. by a factor of six. Similarly, current E2 values from fMRI for specifying the CMF’s decrease towards the periphery range from 0.21° (i.e., steep decrease) to 3.67° (shallow decrease). This is even a factor of seventeen. Classical psychophysical estimates for grating stimuli fall well into those ranges, as do classical values for hyperacuity measures. The recently introduced d2 – denoting the distance from the retinotopic centre where the central CMF is halved – shows more stability but still varies between 6.93 mm and 18.8 mm, i.e. by a factor of three. The same holds for the comparably stable slope of the inverse-CMF vs eccentricity function. Differences in methodology cannot explain these differences. The “correct values” for the cortical magnification factor remain an open question.