

From a Single-letterization Argument to Capacity Regions and Information Inequalities

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Körner and Marton employed a single-letterization argument en route to their characterization of "Images of a set via two channels." We will show how this single-letterization "trick" led to determining the capacity region of the two receiver vector Gaussian broadcast channels via establishing the Gaussian optimality of a non-convex information functional. Motivated by this, we will explore how sub-additivity (or single-letterization) helps us establish a family of inequalities that combines the Entropy Power Inequality and the Brascamp-Lieb inequality. Finally, we will also show that these inequalities have an analogous statement in finite Abelian groups.