Maths Circle India

TIFR-STCS Maths Circle Team

Session 5: June 24, 2022

3 "If I speak the refined speech they speak..." [1]

Credits: Shklyarky, Chentsov, and Yaglom, Selected problems and theorems in elementary mathematics (Mir Publishers, Moscow 1979)

A total of 17 legislative assembly members have been chosen from the assemblies of the four states of Maharashtra, Karnataka, Telangana and Andhra Pradesh to form a legislative tribunal for

negotiating the sharing of the waters of the Krishna river which originates near Mahabaleshwar and flows through their states on its way to the Bay of Bengal.

Each of the legislators in this tribunal knows at least one of the three languages Marathi, Telugu and Kannada. Due to reasons of political posturing and image, some pairs of legislators are forced to avoid a particular language out of these three when communicating with each other even if both know that language (for example, a Maharashtra legislator may decide for political reasons that he cannot use Kannada to communicate with a particular Karnataka legislator even if they both know Kannada, but he may be willing to communicate in Kannada with his Andhra colleague who also knows Kannada).

Anticipating this problem, the rule for the formation of the tribunal requires that it must be composed in such a way that each pair of legislators shares at least one language (out of these three languages) which they are willing to use to communicate with each other in. This rule is always obeyed during the formation of the tribunal.

According to the rule governing the final report of the tribunal, after three days of negotiations in Mahabaleshwar, the legislators have to constitute a drafting committee of three members. This committee of three has to summarize the decision of the tribunal by writing a report in one of these three languages.

To do this, they must of course have a common language (one of Marathi, Telugu, or Kannada) that they are all willing to use in their communication with each other. When the time to form this committee comes, one of tribunal members calls the press and tells the reporters that according to his information there is no such group of three legislators among them who are all willing to communicate with each other in one of these three languages. Therefore he demands that the tribunal must be dissolved without writing a report.

The reporters have to decide whether to take this legislator seriously. If he is right, it is a good news story and needs to be immediately sent to their newspapers. If not, they would just like to ignore him because the committee will anyway be formed tomorrow and the report written in spite of this political stunt by the legislator.

After thinking about it for a little while, one of them, who likes to solve Maths puzzles as a hobby, tells all the other reporters: If the rule of formation has been obeyed, then what this legislator is saying can never happen. There will always be one group of three that are all willing to use a common language to communicate with each other. Is she right? Explain your answer.

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[1] This is a rough paraphrase of an excerpt from Vālmīki.