When Revolutions Succeed? 80/20 Rule and 7 Plus Minus 2 Law Explain the 3.5% Rule

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Abstract

A statistical analysis of hundreds of successful and unsuccessful revolution attempts led historian to a very unexpected conclusion: that most attempts involving at least 3.5% of the population succeeded, while most attempts that involved a smaller portion of the population failed. In this paper, we show that this unexpected threshold can be explained based on the other two known rules of human behavior: the 80/20 rule (20% of the people drink 80% of the beer) and 7 plus minus 2 law according to which we naturally divide everything into 7 plus minus 2 classes.

1 Formulation of the Problem

Interesting empirical fact. Sometimes revolutions succeed, sometimes they don't. Researchers studying successful and unsuccessful revolutions usually go deep into each individual case, providing specific social, economic, and other explanations for the past success or failure.

A few years ago, researchers decided to analyze *all* successful and unsuccessful revolutions as a whole. The results of this analysis – presented in [1] – are somewhat unexpected: it turns out that there is a "magic" number of 3.5%:

- in the overwhelming majority of cases in which at least 3.5% of the population supported the revolution, this revolution won;

- on the other hand, in the overwhelming majority of cases in which less than 3.5% of the population supported the revolution attempt, this attempt failed.

This conclusion was very unexpected, since, contrary to what historian expected, the resulting "3.5% rule" does not depend on a social or economic situation, does not depend on the severity of the corresponding crisis, does not depend on the strategies of the revolutionaries and of the defenders of the old regime.

How can we explain this empirical law?

What we do in this paper. In this paper, we provide an explanation for this law – namely, we show that this law can be explained based on the other two well-known laws of human behavior: the 80/20 rule and the 7 plus minus 2 law. In the following text, we briefly recall these laws, and we explain how these laws imply the 3.5% rule.

2   80/20 Rule: Reminder

In most human activities, 80% of the results come from 20% of the participants; see, e.g., [2, 3]. For example:

- 20% of the people own 80% of all the world's wealth;

- 20& of researchers publish 80% of all the papers;

- 20% of the people contribute 80% of all the charitable donations; etc.,

not to mention the most frequently cited fact that 20% of the people drink 80% of the beer :-)

The usual explanation for this rule (see, e.g., [3] and references therein) is that the distribution of each of the corresponding quantities – money, papers, beer, etc. – follows the *power law*. To be more precise, if we sort people in decreasing order by the corresponding quantity, then the portion q of this quantity owned by the part p of the population is equal to $q = C \cdot p^\alpha$ for some C and α. Since for $p = 1$ – when we consider the whole population – this portion should be 1, we conclude that $C = 1$ and thus,

$$q = p^\alpha. \tag{1}$$

3   7 Plus Minus 2 Law

When we use common sense, we usually divide all the situations, all the objects, etc., into 7 plus mins 2 groups:

- some people divide everything into $7 - 2 = 5$ groups,

- some consistently divide everything into $7 + 2 = 9$ groups,

- some divide into some number of groups between 5 and 9.

This "7 plus minus 2 law" was discovered more than 60 years ago; see, e.g., [4, 5].

4 How These Two Laws Explain the 3.5% Rule

The 80/20 rule describes a distribution of all possible quantities. In particular, it can be applied to the distribution of influence. We can therefore conclude that 20% of the people exert 80% of all the influence.

What about smaller portions than 20%? From the power law (1), we can make simple conclusions about the resulting influence. For example, if we square both side of the formula (2), we conclude that $q' = (p')^\alpha$, where $q' = q^2$ and $p' = p^2$. In particular, if we apply this conclusion to our original example of

- $p = 20\% = 0.2$ and

- $q = 80\% = 0.8$,

we conclude that the same property holds for

- $p' = p^2 = 0.04 = 4\%$ and

- $q' = q^2 = 0.64 = 64\%$.

In other words, we come to a conclusion that if 4% of most active people act together, they exhibit 64% of all possible influence.

If we get a slightly smaller group of people – e.g., a group closer to 3.5% in size – they will still show about 60% of the overall influence.

What is so special about 60%? Why not 50% – a majority? The reason is very simple: if we have slightly more than 50%, we may not notice that we have a majority – that is why in close elections, when one side gets slightly more than 50% of the votes, there is often a bitter dispute in which both sides honestly and strongly believe that they have won. To be convincing, the majority must be convincing to even the least discriminatory people – i.e., the ones who divide everything into only 5 classes. For such persons to recognize the majority, this majority needs to constitute the majority of his/her 5 classes – i.e., at least 3 classes out of 5. This 3 out of 5 is exactly 60% – so the fact that $\approx 3.5\%$ of the most active people have 60% of all the influence explains why this proportion of people is necessary for the revolution to succeed.

In short, a revolution succeeds if the active people involved in it exert the overwhelming majority of influence – overwhelming in the sense that even the least discriminatory people, who divided everything into only 5 classes, realize that yes, this is indeed a majority opinion. Thus, the 3.5% is indeed explained.

Acknowledgments

References

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