Noncompensatory Rules, Voting, and Welfare

Todd Davies
Symbolic Systems Program, Stanford University
davies at csli.stanford.edu

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Abstract:

Individual decision behavior has increasingly been described by several authors as *noncompensatory*: decisions are based on just a subset (often a minimal subset, i.e. one) of the dimensions that could be thought relevant. A further claim recently advanced is that these rules are adaptive (that they "make us smart"), because the environments in which decisions are made are themselves noncompensatory -- affording the discard of most information. This paper examines the consequences of noncompensatory rules applied in the context of voting and elections, both by individuals and collectives. Both theoretical and empirical arguments are put forward which question the collective efficacy of noncompensatory rules, while suggesting that they may yet be descriptive and explanatory of voting behavior and political party positioning.

Keywords: Noncompensatory rules, behavioral decision theory, electoral competition, utilitarianism

1 Introduction

Behavioral theorists have focused increasing attention on "noncompensatory" (NC) rules for judgment and choice (e.g., Johnson & Meyer, 1984; Mintz, 1993; Gigerenzer & Selten, 2001). But the concept of NC appears to lack a general definition in the literature. I define a decision rule as NC if the outcome it chooses is insensitive to variables that change the utility of the outcome, i.e. the rule at least sometimes either ignores or weights such variables so that no values they might assume could affect the decision.

Examples include:

- *Satisficing*. Choose the first alternative that passes some threshold, independent of whether other alternatives would yield higher utility (Simon, 1955).

- *Elimination by Aspects (EBA)*. Step through dimensions along which options differ, from most to least important, eliminating those that do not pass a preset threshold on each dimension until only one alternative remains (Tversky, 1972).
- *Lexical Choice Rule*. Compare alternatives along an ordered set of dimensions, "with the choice between any alternatives being made on the first dimension on which they differ (Wissel, 1973).
- *Priority Heuristic*. Application of LCR to standard gambles (Brandstatter, Gigerenzer, & Hertwig, 2006).

NC rules can be optimal if they only discard information irrelevant to choice, i.e. when a change in the utility ordering between options is impossible. It has been claimed that such rules are adaptive because environments are often noncompensatory (e.g. Gigerenzer & Selten, 2001). But some rules that are used to describe choice behavior lead to inconsistencies between (i) choices induced by the rule and (ii) preferences or utilities (individual or collective) induced from all the variables. NC rules also induce inconsistencies (hence cycling) between different sets of options. A theory of NC rules can help us to distinguish between different types of consistency violations with which such rules are associated, and tell us whether a compensatory rule would eliminate such violations.

NC rules pose a number of interesting questions concerning voting and preference aggregation, including the following:

- What are the individual and collective consequences if voters use noncompensatory rules to decide for whom to vote?
- Do they make us "collectively" smart?
- How would electoral competition models be affected?
- Do voters use noncompensatory rules in their individual voting decisions on a large scale?
- How does the concept of noncompensatory (e.g. majority and plurality rule, runoff) rules versus compensatory rules (e.g. Borda count, total utility) relate to social choice and aggregation?

2 Choice-Preference Consistency and Issue-Based Voting

"Issue-based" models of voting assume that each individual voter evaluates each candidate or party in an election on one or more issue dimensions. The concept of an issue is quite general. It can apply to any dimension used for comparing candidates or parties, including policy positions, personal or general valence characteristics, and perceived attitudes.

We can distinguish different types of choice-preference consistency for issue-based voting:

(Weak) Majoritarian Consistency (MC).* If X and Y are parties, and X is chosen over Y by a majority in an election, then Y's issue positions should not all be preferred to X's by a majority of voters.

Individual Consistency (IC). If a voter chooses party X over party Y, then that voter should not prefer Y's platform over X's.

Group Consistency (GC). If X is chosen over Y in an election, then the voters should not collectively prefer Y's platform over X's.

Issue-based NC models have been applied in social choice contexts at least since Wissel (1973), who defined the "strictly lexicographic choice rule" (LCR) as a sequence of comparisons between alternatives "with the choice between any alternatives being made on the first dimension on which they differ" - an application of EBA.

2.1 Weak Majoritarian Consistency

LCR and other NC rules can easily be shown to violate MC*.

Example 2.1.1. Consider the following *lexicographic priority profile* for isssues A and T and positions + (favor) and – (oppose)

Voter 1	Voter 2	Voter 3
A-	T-	A+
T+	A+	T+

Imagine further that there two parties whose platforms are the following:

- L: A+T+
- R: A-T-

Thus, a majority prefers A+ to A-, and T+ to T-. But if the voters apply LCR, they will elect R with platform A-T- over L with platform A+T+, even though A+ and T+ both have majority support. Thus *a noncompensatory rule can violate MC**.

Example 2.1.2. Now consider the following proportional utility profile defined for each voter's utilities over total platforms:

States	Voter 1	Voter 2	Voter 3
A+T+	3	3	10
A+T-	0	10	7
A-T+	10	0	3
A-T-	7	7	0

Assuming additive, compensatory utilities, we can construct the following profile for voters' proportional utilities for each possible issue position:

Positions	Voter 1	Voter 2	Voter 3
A+	0	3	7
T+	3	0	3
A-	7	0	0
T-	0	7	0

In this example, which is consistent with the profile in 2.1.1, a majority prefers A+ to A- and T+ to T-, but elects party R (A-T-) over party L (A+T+). Utility allocation is compensatory, so *NC rules per voter are not required for violating MC*.*

2.2 Individual and Group Consistency

Normative theories of decision making generally assume or imply adherence to a principle of *revealed preference*, such as the following:

> If an individual prefers X to Y, then the individual will choose X over Y whenever both are available.

But revealed preference cannot be assumed in a psychological theory, because people may choose in ways that are at odds with their true preferences. Individual consistency (IC) and group consistency (GC) thus require an assessment of preference other than choice.

We can distinguish between rules applied by individual voters and those applied in determining the collective choice. A noncompensatory rule applied by individual voters can lead to violations of IC (inconsistencies between one's vote and one's utilities for each option).

Example 2.2.1. As a simple example, consider a voter who votes according to a lexicographic choice rule applied to the following additive utilities:

Positions	Voter's Utilities
A+	4
T+	3
Z+	3
A-	0
T-	0
Z-	0

Using an LCR, the above voter will vote for a party with platform A+T-Z- over one with platform A-T+Z+, even though the latter platform provides higher total utility for the voter, violating IC.

A noncompensatory rule applied to the aggregation of preferences (a social choice rule) can lead to violations of both IC (by inducing strategic voting) and GC (via both strategic voting by individuals and information loss from the noncompensatory nature of the aggregation itself).

Example 2.2.2. Example 2.1.2 above shows how a noncompensatory social choice rule can violate GC even when individual voters obey IC. Under a majority social choice rule, voters in 2.1.2 will vote for their highest utility options, but the chosen option for the group will be of lower total utility (U(A-T-)=14 but U(A+T+)=16). The example shows that it is possible for majority rule elections to violate both MC* and GC even when voters obey IC.

The possibility that a coalition of minorities prioritizing issues they care about could defeat a party with majority support on all issues under majority rule has been known at least since Downs (1957), and as the above example shows, it can also violate GC. The concept of an NC social choice rule helps us to explain these results, however, because majority rule is NC with respect to utility across voters.

2.3 Generalized Noncompensation

We can generalize the concept of NC by defining an “availability set” as the set of variables that serve as inputs to a decision rule in a given choice situation. A rule is NC within a set if it discards information in the set. But all rules that determine choices using an availability set that is a proper subset of the “relevant set” (i.e. that is less than all the possibly relevant variables) are NC with respect to the relevant set.

Thus, all rules in practice are NC at some level, though they may be compensatory with respect to the availability set, and therefore any rule applied to the availability set may be inconsistent with its application to the relevant set, defining comprehensive welfare.

We can summarize and contrast the properties of NC and compensatory rules with the following propositions.

- Any NC rule at the appropriate level (individual or social, availability or relevant set) violates MC*, IC, and GC.
- A fully compensatory individual choice rule (voting by utility) violates MC* and GC (if the social choice rule is noncompensatory), but does not violate IC.
- Any rule (individual or social) that violates IC also violates GC.
- The only social choice rule that does not violate IC or GC is also the only fully compensatory social choice rule: the utilitarian rule applied to the full relevant set.

3 Intransitivity and Party Competition

Consider again the priority profile from example 2.1.1:

Voter 1	Voter 2	Voter 3
A-	T-	A+
T+	A+	T+

All platforms on A and T are in an intransitive cycle under majority rule:

- A+T+ is defeated by A-T-
- A+T- is defeated by A+T+
- A-T+ is defeated by A+T- and A+T+
- A-T- is defeated by A-T+ and A+T-

Hence lexicographic voting can lead to and account for intransitive cycles across different pairs of party platforms. We might therefore ask what will happen if parties can change their platforms from one election to the next, assuming a constant priority profile across the electorate and lexicographic voting in each election. The voters can collectively have many different priority profiles. Will these profiles give rise to different patterns of election results over time?

3.1 Party Competition under Lexicographic Voting

Let us call the following model **L**. Assume:

- two parties: X (first mover) and Y (second mover);
- a fixed set of M issues (e.g. A and T, with M=2) with positions specified for each issue;
- a static priority profile P specifying a full set of strict priorities

over all M issues for an odd number N of voters, who vote using a lexicographic choice rule;
- each party's platform specifies a valence on each issue; and
- if platforms are identical, the party most recently switching to the platform loses (the “Johnny come lately” constraint).

A series of elections can be modeled as a dynamic game:
- in the first election: party X chooses a platform, and party Y chooses a platform in response, with the winner chosen by majority rule;
- in all subsequent elections, the incumbent party retains the same platform, but the opposition party may change platforms.

Proposition 3.1.1. All priority profiles under model **L** fall within exactly two equivalence classes, either:

- stable – one platform defeats all others (Black-Downs equivalence), or
- even – choosing any Nash strategy results in neither party winning more elections in the long run than the other.

Example 3.1.2. In the profile below, platform A+T+ defeats all other platforms, and is therefore an example of the stable case.

Voter 1	Voter 2	Voter 3
A+	A+	A-
T+	T-	T+

The even case is illustrated by the profile from example 2.1.1, discussed above.

Proposition 3.1.1 can be proven by considering two classes of profiles: (I) one platform defeats all others, and (II) no platform defeats all others. These two classes are obviously exhaustive because it is not possible for more than one platform to defeat all others. For class I profiles, the Nash equilibrium is party X choosing the winning platform in the first election, which will mean that it can win every election thereafter since no other platform can defeat it, and as long as party X stays with the winning platform, party Y will lose if it chooses the winning platform due to the “Johnny come lately” rule. For class II profiles, the facts that N is odd and that the priority profile is strict and complete imply that, for each pair of platforms, there will be a unique winner. Since no platform defeats all others, by

hypothesis, then there must be a cycle involving two or more platforms (otherwise the profile would be in class I). Whichever platform party X chooses as its platform in the first election, party Y can therefore choose a platform that will defeat it, and since the platforms are in a cycle, party X can win the next election by choosing a platform that defeats party Y's platform. The process iterates indefinitely, so that at every even number of elections held, the two parties have won equal numbers of elections.

We can elaborate on the above proposition by imposing a party identity constraint, e.g.

- a party may not change its position on more than one issue from one election to the next.

Or, alternatively,

- a party may not change its position on all issues from one election to the next.

The basic result from above still holds, however:

Proposition 3.1.3. All priority profiles under model **L**, augmented by any party identity constraint restricting the number of issue positions that a party can change, from one election to the next, to some number in the set {1,...,M}, fall into either the stable or the even class.

Obviously, profiles in class I (one stable winner) are unaffected by the addition of the party identity constraint. Augmenting the model with a party identity constraint simply means that for class II (no stable winning platform), a party may need to move through some number of intermediate platforms to get from a losing platform to one that will defeat the incumbent platform, which, under the assumptions of the model, the incumbent party will not change as long as it does not lose an election. Since platforms are in a cycle, each party can go through the same optimal cycle of platform changes, so that any number of consecutive election victories by one party can be matched by an equivalent number of victories by the other party before the party with second mover advantage pulls ahead in the total number of elections won.

3.2 Realism and Mixed Models

Model **L** makes some assumptions that, of course, may not hold in practice. How much difference does this make?

- The model assumes just two political parties. This approximates

the situation in the United States, which is structurally set up as a two party system and where additional parties usually have marginal to no impact. For polities with more than two parties, or to model party competition more generally, of course, the model would need to be augmented. Intransitive cycles are still possible with more than two parties, however.

- The requirement that N be an odd number just ensures that there are no tie elections, which is a realistic assumption for any large N, even or odd.
- Real priority profiles obviously do not remain static over a series of elections, but historical research (e.g. Page and Shapiro, 1992) shows that public opinion in the U.S. tends to remain stable on most issues over time.
- The assumption that each party specifies a position on each issue is not very restrictive, because failure to take a position can itself be taken by voters as occupying a position on the issue for voting purposes.
- The "Johnny come lately" constraint models the idea that party identity is somewhat difficult to establish, so that if two parties have the same platform, the one who has had it longer will have an advantage. This is generally the case, other things being equal, both because party identity takes a while to establish after a change in positions and because the party that adopts a given platform earlier has greater claim to holding its positions authentically.
- The assumption that the incumbent party cannot change its platform is grounded in the fact that the incumbent party is governing, and hence cannot plausibly present itself as opposing its own policies. Also, when a party has won an election, it is likely to see itself as having a winning formula, and for that reason may be practically unlikely to switch platforms before losing an election. Another way to model these assumptions would be to stipulate that an incumbent party which switches platforms will be at a disadvantage in doing so.

The model is meant to be illustrative, of course, rather than strictly realistic. It shows that it is possible for parties to cycle through different platforms in a game of jockeying for advantage with an electorate that predictably votes in a noncompensatory way. The idea that parties are more likely to be rational and to act strategically in response to heuristic voting by individuals is an important feature of the model, combining insights from both psychology and formal

modeling in a considered way.[1]

What if some, but not all, voters apply a lexicographic choice rule to their voting decisions? The percentage of lexicographic choice rule voters only needs to be enough to swing election. Given a critical mass of LCR votes, a Downsian party that chooses the majority position on every issue in an even class priority profile election will lose to a strategic party that bases its platform on lexicographic voters. What constitutes a critical mass depends on other quantities, such as polarization among LCR voters.

4 Empirical Connections

The theoretical arguments made above establish, inter alia, that noncompensatory voting rules, applied by individuals, can lead to different types of violations of choice-preference consistency at both the individual and group level, and that they can induce parties to cycle through position platforms under majority rule. Lexicographic choice rules and intransitive majority preferences have interesting theoretical implications. But formal behavioral models are of most interest if they help us to understand actual behavior. How well can the concept of noncompensatory rules help us to understand actual voting and party competition?

4.1 Voting Behavior

Lexicographic rules do very well in competition with compensatory models (e.g weighted and unweighted summation) in predicting human choice data (Gigerenzer & Selten, 2001, Brandstatter et al. 2006). For elections, data are observational, but a few studies have been done supporting widespread use of LCRs and NCRs (Dutter, 1981; Williams et al. 1976; Bronner & De Hoog, 1981)

Models based on Downsian assumptions and retrospective voting (e.g. Key, 1966; Bendor, Kumar, & Siegel, 2005) appear inadequate for explaining voting behavior in the U.S.:

- Downsian models imply that parties should seek and will win with positions that appeal to the median voter. From 2000 through 2004, however, Democrats appeared to hold majority views on more issues than Republicans at the national level in the U.S., but they lost the major elections for control of the Presidency and the Congress (Hacker & Pierson, 2005).

1 For another recent model combining rational/self-interested politicians with boundedly rational, self-interested voters, see Muthoo & Shepsle (2006).

- Retrospective voting theories hold that voters compare conditions before and since an incumbent has been elected, and adjust re-election preferences upward or downward depending on the direction of the retrospective trend. But such theories have a hard time explaining phenomena such as the large increase in the popularity of President George W. Bush immediately following the 9/11 attack, widely regarded as one of the worst single events in U.S. history (Pollingreport.com, 2007).

The success of the Republican Party in the U.S. during the first half of this decade thus presents a challenge to theories of voting behavior. But if a substantial number of voters do not aggregate across the several different issues that make up an election, and instead vote in a highly noncompensatory manner approximated by a lexical choice rule, this could help explain both how Republicans were able to win elections while maintaining minority positions, and how their popularity could increase despite negative events happening while they controlled the government. Noncompensatory voting behavior based on prioritizing one or a small number of salient issues could lead a majority to vote for a party (i.e. the Republicans in the U.S.) with largely non-majority positions if that party dominated the other for a majority of voters on their priority issue(s).[2]

4.2 Party Positioning

One of the top Republican Party strategists, Grover Norquist, has in fact provided evidence that the Republicans consciously sought to create a majority coalition out of voting blocks that prioritize particular issues:

> "When you look at the modern center-right coalition, it's a group of people who stand around a circle and put their foot in on one issue:
>
> - Taxes: Don't raise my taxes.
> - Property rights.
> - Gun owners. Don't take my Second Amendment rights.
> - Home schoolers – let me educate my kid.
> - All the various communities of faith – evangelical Protestants,

2 For a previous model explaining the success of antimajoritarian policies in the tax domain on the basis of relative issue salience, see Roemer (1998).

> conservative Catholics, Orthodox Jews, Muslims, Mormons. People for whom the most important thing is practicing their faith and raising their kids.
>
> The reason the center-right coalition holds together, the Reagan voters, the George W. Bush voters, is that everybody is around that circle, and on the issue that matters to them, the issue they vote on, they want the government to leave them alone. That's why everyone can cheerfully work together.
>
> …
>
> I'm on the board of the NRA. Some people who vote on the gun issue have what I consider the oddest views on trade with China. But politically I don't care whether they're for free trade with China, because they vote on the gun issue. And people who want to be left alone to practice their faith, if you ask them would you be for restrictions on gays or other things, they may say yes. They don't vote on that issue. …
>
> Karl Rove and President Bush, as governor, understood the nature of the modern Republic Party. … Pat Buchanan [who ran against Bush] – he said 'I've polled the Republican Party: 70 percent want fewer immigrants. I polled the Republican Party: 70 percent want less trade with China.' He forgot to ask a second question: Do you vote on that issue?"[3] (Norquist & Rose, 2005)

Building a coalition out of minority voting blocks that prioritize different issues is one way that a party could take advantage of LCR-type voting. But another way might be to find or create an issue that a majority of the electorate prioritizes, and then work to establish an advantage over the other party on that issue. Politicians who are skilled at identifying and focusing on issues that voters prioritize (such as public safety following the September 11 attacks in the U.S.) could position themselves to be the preferred party on that issue and to increase the number of voters who prioritize it, thus explaining how a party in power could increase its popularity following events that are widely seen as negative for the country as a whole.

One of the puzzles in the history of U.S. political parties has been the large shifts over time in the identities of the two main political parties: the Republicans and the Democrats. In the mid- to late- nineteenth century, the Republicans most strongly represented the northern industrial white establishment and African Americans, while the Democrats most strongly represented white voters in the south. A

3 Bullet points added for emphasis. Ellipses represent omitted material, and square bracketed material is added for information.

century later, the two parties divided the country along similar lines, but they had swapped sides!

This is just the kind of pattern that intransitive cycling through party platforms across a series of elections, as in model **L** described above, would predict: an underlying stability in the profile of the electorate, but instability in where parties position themselves in the issue space, leading to very mutable party identities over long time spans. The realignments in U.S. political parties do not prove that model **L** is accurate or that voters are following lexicographic choice rules when they vote. But these theories point to some possible explanations and suggest further study to determine how well they predict data on a finer scale.

5 Conclusion

Let us return to the main questions that were posed earlier, and summarize the arguments above in terms of them.

- What are the individual and collective consequences if voters use noncompensatory rules to decide for whom to vote?

While the above analysis argues that all rules are noncompensatory in practice, rules that are *highly* noncompensatory (such as lexicographic choice rules), when they are used by individual voters, are especially prone to violations of choice-preference consistency at both the individual and collective (group) levels.

- Do they “make us smart”?

Lexicographic choice has been called a “simple heuristic that makes us smart” (Gigerenzer & Todd, 1999). But the above analysis suggests that, at both the individidual and social levels, LCR can lead us to make choices that are not consistent with our underlying preferences, precisely because they do not take into account information that offsets the advantage that an option may have on one priority dimension.

- How would electoral competition models be affected?

LCR rules suggest models of party competition that emphasize positioning to capture majority coalitions of priority voters. The model developed in this paper leads to platform cycling of the kind seen in the U.S. over the last century and a half, and provides one explanation for recent paradoxes in elections and majority

preferences in the U.S.

- Do voters use noncompensatory rules in their individual voting decisions on a large scale?

Previous research has focused on this question and provides reasons to think that noncompensatory rules are prevalent in voting behavior. Just how well LCR and similar rules describe voting behavior, however, is a topic for further research.

- How does the concept of noncompensatory (e.g. majority and plurality rule, runoff) rules versus compensatory rules (e.g. Borda count, total utility) relate to social choice and aggregation?

I have argued that all social choice rules are noncompensatory in practice, because they all ignore variables that might bear on the desirability of collective outcomes. The same could be said of individual choice decision procedures as well, of course. But rules differ in just how much information they throw out. A characterization of how much information different rules discard, and the consequences of this under different environments, is an important research topic in both individual and group decision making.

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