

On Accountability and Hierarchy

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Democracy promises accountability via elections; bureaucracy promises coordination via hierarchy. Many scholars believe these properties conflict. We prove, however, that accountability is precisely what unifies democracy and meritocratic (Weberian) bureaucracy. Central to the concept of meritocracy are performance reviews. We prove that a review system where all individuals and groups are accountable must also be democratic. Thus, meritocratic hierarchy, accountability, and democracy are intertwined. But accountability in modern political systems confronts a significant issue. Such systems include many knowledge-intensive specialties, and since specializations are limited to some but not all members of an institution, the full accountability of democracies entails review of specialists by amateurs. We prove that modern political systems necessarily exhibit this tension. It is a hallmark of modern institutions rather than a problem to be solved.

INTRODUCTION

Political scientists have long raised questions about the relation between democracy and bureaucracy. Many of these questions persist (Cook 2014; Kettl 2008; Rosenbloom and McCurdy 2006). Most significantly, these institutions have often been considered antithetical. There is evidence for this belief. Leaders of “despotic leviathans” (Acemoglu and Robinson 2019) have often used armies and internal security agencies to crush opposition. Early democrats noted the problem. Radical eighteenth-century Whigs, for instance, opposed the creation of standing armies (Skelton 1996, 328). For them, bureaucracy implied hierarchy and hierarchy meant oppression.

Yet hierarchy is ubiquitous. Even governments that score highest on democracy scales use hierarchical organizations. Because many societies have independently discovered hierarchy, at different times for different purposes, this organizational form must provide important benefits. True, one “benefit” is crushing dissent. Others, however, are public goods: defending one’s country from invasion or building irrigation systems. Thus, in the late nineteenth century, some political scientists (e.g., Wilson 1887) argued that hierarchical organizations are indispensable to large complex societies, democratic as well as authoritarian. Thus, although hierarchy is an old kind of organization,

Weber included it as a defining property of modern bureaucracy (Gerth and Mills 1946, 197).


Although hierarchy is old, two other key properties of Weber’s theory of modern bureaucracy—specialized knowledge and formal merit-based personnel processes—have become widespread more recently. The two properties are related: the former refers to an official’s underlying competence; the latter, to assigning people to positions based on their education, training, and observed performance (thus, their estimated competence). Both properties are related to hierarchy. In merit-oriented bureaucracies, officials are typically accountable to their superiors for their performance: good performance yields bonuses or promotions; bad performance triggers pay freezes, demotions, or termination. Thus, hierarchy, specialized knowledge, and meritocratic personnel procedures—arguably the core of modern bureaucracy—are intertwined (Kettl 2008, 372).

But is this core internally consistent? Is performance accountability consistent with hierarchy? Are those properties consistent with specialized knowledge? And overall, is modern bureaucracy more consistent with democracy or, as many have feared, with autocracy?

Our article examines these issues. First, we study the relation between accountability and hierarchy. An obvious problem with hierarchical organizations is that since nobody in such systems can review or replace their superiors, inept leaders may endure indefinitely. Similarly, poor performance in parts of the organization, including the top position, may go uncorrected: the boss may protect incompetent cronies as well as himself. Hence, absent corrective mechanisms, entire branches of an organization may degenerate and remain deficient indefinitely: for example, police may use deadly force inappropriately for a long time. Such problems are inherent to all governments, authoritarian as well as democratic, that use hierarchical institutions.

One approach to such problems is review by an external agency. But this design puts that agency at

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the top of the hierarchy. This does not solve the problem; it merely postpones it. If the external agency is itself incompetent, there is no mechanism to repair *that* deficiency. One could, of course, create a supervising agent that reviews the external agency, but this too moves the problem a step up without solving it: who guards the guardians? An ever-expanding hierarchy cannot solve the problem for any type of government. What will?

We will show how the issue of accountability in meritocratic bureaucracies creates a ripple effect that can only be solved by democratic controls.¹ We present a model of accountability which establishes that if all individuals and groups are held accountable by somebody, then authority systems must be pervasively *cyclic*: between any two individuals i and j , there is a performance-review path from i to j and another from j to i (Theorem 2). Both the symmetry and the pervasiveness of accountability are, in our view, the essence of democracy.² By creating cycles of accountability, mass suffrage elections are enormously useful.³

Thus, our first major finding implies that insisting on performance accountability not only makes our concept of modern bureaucracy more internally consistent, more importantly it unifies democracy and meritocratic bureaucracy into a coherent picture.⁴ Far from being antithetical, meritocratic bureaucracy and democracy belong to the same family of institutions.⁵ In contrast, an authoritarian system that uses a meritocratic bureaucracy (e.g., Imperial Germany 1871–1914) is an awkward hybrid: everybody below the ruler or dominant oligarchy can be held accountable for job performance *but top decision-makers are not reviewed by anyone outside the governing coalition*. (For example, Kaiser Wilhelm II, who was incompetent in military matters [Röhl 2013], was unqualified to review the German General Staff in World War I. But he was accountable neither to the Reichstag nor to voters. Hence, when he was sidelined by the military in 1916, *de facto* the government was headed by two top generals, Hindenburg and Ludendorff, who were not accountable to anyone.) Thus, the fundamental

inconsistency is not between democracy and modern bureaucracy; it is between authoritarian systems and meritocratic hierarchies.

We then turn to the relation between universal accountability and the ubiquity of specialization in contemporary political institutions. Because expertise always involves specialized knowledge—domain-general experts do not exist (Feltovich, Prietula, and Ericsson 2018, 66–7)—and because specialized knowledge is necessarily restricted to a few agents, a challenging issue can arise: specialists reviewed by amateurs. This can happen anywhere in the cycles of accountability identified by Theorem 2. In presidential elections, few voters are specialists in electoral procedure, public policy, or institutional rules. (How many voters understand the Senate filibuster?) Therefore, this accountability relation includes the review of professionals by amateurs, producing a tension between accountability and expertise (Dahlström and Lapuente 2022).

Political leaders with some specialized knowledge are reviewed by less informed voters; similarly, those leaders review bureaucrats who have more programmatic knowledge than they do. (Because Weber explored though never resolved this issue, we call it a Weberian tension.) Our second thesis is that Weberian tensions are inevitable in *all* modern regimes, authoritarian as well as democratic. The argument is short: modern regimes are knowledge-intensive systems, such systems must be staffed by people with specialized knowledge, and this, when joined to the criterion of accountability, implies that some specialists must be reviewed by nonspecialists (Theorems 3 and 4). The good news is that this problem is not confined to democracies; it also impacts authoritarian systems (Theorems 3–6). Thus, we believe that the issue of ill-informed voters has gotten too much scholarly attention and that of ill-informed leaders, too little. In knowledge-intensive systems, *everyone* is an amateur in almost all complex domains. This fact and its implications, for example, the review of specialists by non-specialists, shows up throughout modern politics. It is not restricted to relations between voters and leaders.

The rest of the article is organized as follows. The next section presents the basic model, which examines the relation between accountability and hierarchy, while allowing for many different kinds of specialized knowledge embedded in hierarchies. Then we analyze the relation between accountability and specialized knowledge—Weberian tensions. The last section concludes.

THE MODEL

We study an organization, O , with $n > 1$ members who may have different specialties. There are $m \geq 1$ different specialties in the society.⁶ S denotes the set

¹ Some scholars have similarly argued for “the necessity of buttressing meritocracy with democracy” (Hui 2016, 150).

² Rousseau’s *On the Social Contract* describes symmetry as a situation where there is no associate over whom he does not acquire the same right as he yields others over himself.

³ The literature on electoral accountability is extensive; for overviews, see Ashworth (2012) and Gailmard (2019). For a discussion of democratic accountability that goes beyond elections, see Warren (2014).

⁴ For an early statement of this thesis, see Finer (1941).

⁵ We are *not* claiming that all kinds of bureaucracies are compatible with democracy. That assertion is clearly false. Bureaucracies governed by militantly ideological parties or by militaries opposed to civilian control are incompatible with democracy. Bureaucracies run by patron-client networks and “Napoleonic systems” (Dahlström and Lapuente 2017, 78–87) in which “administrative bodies enjoyed autonomous independence from each other and from politicians” (82) pose serious obstacles to democratic governance. Importantly, none of these systems are fully meritocratic organizations. Some also de-emphasize expertise; per the Maoist slogan, “better red than expert.”

⁶ Our model allows for subspecialties, e.g., both a doctor and an internist count as specialties, as would pilot and helicopter pilot. Someone in O may have mastered multiple subspecialties or specialties.

of all specialties in O ; S_i , the set of agent i 's specialties. (S_i may be empty. This represents someone without specialized training or education.)

Organization O exhibits an accountability structure: the performance of some or all members of O is reviewed by others in the organization.⁷ We impose no assumptions about the review relation other than precluding self-review (i reviewing himself). Thus, multiple officials may review the same individual or two officials may review each other (i reviews j and j reviews i).⁸ Reviews may occur on a fixed schedule or may be triggered by exogenous shocks. Indeed, the model represents neither the causal structure underlying a reviewee's performance nor why i reviews j . It thus obtains generality at the expense of granularity.

An unconstrained review relation allows for all theoretically possible review structures. Not all such structures, however, are reasonable models of organizations. For instance, what distinguishes an organization from an arbitrary collection of individuals is that an organization's members are linked with each other. In our conceptualization, a link is a review relation. Therefore, a set of people in which someone is not linked with anyone else is inconsistent with the very idea of an organization. Similarly, assuming that O can be partitioned into two or more sets such that nobody in one set is linked with anyone in the other would not make sense.

Formally, we represent an organization's review structure by a directed graph whose nodes are members of O and edges are binary review relations.⁹ For the above reasons, we assume that this directed graph is *weakly connected*: in its undirected graph, any two nodes are connected by a set of edges.

We have stated that we limit our analysis to organizations in which the performance of some or all of the officials is reviewed by others in O . This assumption reflects two issues confronting meritocratic societies. First, organizations should be allowed to adopt any review structure they deem effective: A strict hierarchy may work for the military but not for a policy analysis unit. For many optimal review structures, top officials will be unaccountable to others in the organization; hierarchies are like that. Such structures may, however, also illicitly benefit organizational members (corrupt officials may benefit from a scheme of the agency's leader) while harming people outside the organization (citizens who must bribe corrupt bureaucrats). Meritocratic review, which would guard against corruption, would require establishing an independent organization with the power to review officials who are unaccountable inside their organizations. Indeed, in a meritocratic (i.e., modern) society, the performance of *everyone*—including government employees—must be regularly reviewed. This is, we believe, a central

feature of the concept of a meritocracy. We call the meritocratic requirement that everyone be reviewed *universal accountability*.

Accountability can be defined and assessed from the perspective of one organization or from that of a society seen as a set of organizations. We first consider the case of a single organization. The following definition formalizes the criterion of universal accountability in this context. For obvious reasons, the definition excludes self-review.¹⁰

Definition 1. An organization's review structure satisfies *universal accountability* if and only if all members of the organization are reviewed.

Definition 1 requires that there is at least one j who reviews i . There may be several: for example, both Congress and the President could review a regulatory commission. Thus, universal accountability allows for separation of powers as well as other complex authority structures not limited to standard tree hierarchies where every subordinate has exactly one superior. Hence, a political elite comprised of legislators, judges, and a president or prime minister may constitute the top of a government's review structure.

Of course, satisfying universal accountability means that *somebody* reviews members of the political elite. One possibility: legislators review judges and vice versa. This would be a review cycle. The following definition of a cycle is standard in graph theory.

Definition 2. An organization's review structure contains a *cycle* if there are at least two members of O , i_1, \dots, i_n , such that i_1 reviews i_2 , \dots , i_{n-1} reviews i_n , and i_n reviews i_1 . A review structure without cycles is called *acyclic*.

These definitions allow us to state our first result. (For all proofs, see the Supplementary Material.)

Theorem 1. No review structure of any finite organization with any set of specialties satisfies both acyclicity and universal accountability.

Two comments are worth making. The first pertains to S , the organization's set of specialties; the second, to O 's finiteness.

First, Theorem 1 holds for all possible sets of specialties in O —that is, all possible sets of individual repertoires. The degenerate case— S_i is empty for all i —is admissible, as is O having a rich assortment of specialties.

Second, obviously, all real institutions have finitely many members. Hence, precluding infinite organizations may seem pedantic. But there is a reason to emphasize the obvious: without it, the theorem is invalid. Designing review structures that satisfy both universal accountability and acyclicity is easy for organizations of infinite size. For example, number the organization's members 1, 2, 3, ... and have official

⁷ One could interpret this as including artificially intelligent agents.

⁸ Formally, the binary review relation is irreflexive but not necessarily asymmetric.

⁹ For good introductions to the theory of directed graphs, see Bondy and Murty (2008) or Diestel (2017).

¹⁰ Self-review violates meritocracy, both in the word's ordinary sense and as it is used in organization theory. This does not imply that self-review never happens. We are merely adopting the widespread view that meritocracy requires external review.

$i + 1$ review i . Then everyone's performance is assessed, yet there are no cycles. Linking performance review to authority lets us state the property this way: institutions with infinitely many members always have new possible superiors. In finite organizations, one must eventually run out of them; it is exactly then that universal accountability and acyclicity become inconsistent. Hence, Theorem 1 could be restated as follows: there exist review structures which satisfy both universal accountability and acyclicity if and only if an institution has infinitely many members.

Having explained why the finiteness of organizations is analytically important for the tension between universal accountability and acyclicity, we will not repeat this assumption. Henceforth, we assume all O 's are finite.

Our explanation of the difference between a finite and an infinite domain is an instance of a well-known infinite regress argument (cf. MacKay 1980, 112–7) that has been used, notably by St. Thomas Aquinas, to prove the existence of God. The problem with infinite regress explains why and how political philosophers have looked for ways to justify a hierarchical polity, with nobody reviewing the monarch at the top of society. Since universal accountability and hierarchy are inconsistent, justifying monarchy must depart from the assumptions of our model. One departure: assume that certain decision-makers are perfect and hence need no review. God is such a decision-maker. Suppose that people in a society, represented as a single institution with a monarch at the top, agree that universal accountability holds if every *imperfect* decision-maker is reviewed. Perfect decision-makers, who always do the right thing, need not be evaluated. Then one can easily prove that acyclicity and universal accountability are consistent if and only if a society's top officials are reviewed by a perfect decision-maker.

Efforts to evade Theorem 1 abound in political history. Believing that a monarch is accountable to an omniscient and benign God is comforting. (In many coronation ceremonies, monarchs are consecrated—associated with the sacred—when anointed.)

But there is problem: perfect decision-makers may not exist. Yet, as long as everybody *believes* that one exists, they can also believe that monarchy and accountability are consistent. Suppose that everyone in a society shares this belief system:

- (1) God exists.
- (2) God is perfect.
- (3) God is accountable to nobody.¹¹
- (4) The king is accountable only to God.
- (5) Everyone else in the society is accountable to the king.

Belief (5) could be indisputable: a grisly end awaits those who displease the king. Openly questioning (1), (2), or (3) would be equally dangerous: even today

some monarchies punish atheism or apostasy by death. But although everyone in the society, possibly excepting a cynical king, believes (1), (2), and (4), nobody *knows* whether they are true. Thus, for secular people, the belief system of (1)–(5) provides no escape from Theorem 1.¹²

Henceforth, we assume that all decision-makers are imperfect. Thus, we will be examining real organizations in modern cultures, and following Weber, we take “modern” to include “secular.”

MODERN AUTHORITY SYSTEMS

Theorem 1 implies that in modern societies something must give. Should we relax universal accountability or acyclicity? When answering this question, we should consider how badly a criterion is violated. For example, we might allow a violation of the accountability requirement if only minor positions are unreviewed. What seems critical is the significance of unaccountable positions. Even one unaccountable position could be dangerous if the office is important. In particular, tree hierarchies satisfy acyclicity and only one position is not reviewed. Hence, we could keep the number of unreviewed positions to a bare minimum while preserving acyclicity. But this one violation may ruin the entire organization.

The following definition distinguishes different positions in an organization. Obviously, some offices are more important than others.

Definition 3. Individual i is a *leader* in organization O if and only if i is not reviewed by anyone in O .

Leaders review others but are not reviewed by anyone in the organization.

Typically, a leader reviews only a few subordinates. She can, however, hold her subordinates accountable for their review of *their* subordinates. We say that i *indirectly* reviews k if i reviews j and j reviews k . We will use this terminology henceforth: i indirectly reviews k means that there is some j , distinct from both i and k , who is reviewed by i and who reviews k . (This may be a long chain: many officials may be in-between i and k .) It will sometimes be natural to refer to a matched pair: direct as well as indirect review. Direct review is simply the fundamental binary review relation: i reviews j , without intermediates.

Because we make few assumptions about which review structures are admissible, requiring only that they be weakly connected and exclude self-review, a leader or other official may both directly and indirectly review somebody. In the above example, i could review k as well j (and as before, j reviews k). This often happens: for example, if k 's immediate superior, j , mishandles his review, then k can appeal to j 's superior, who could review k 's performance herself. In other circumstances, i may be able to review only j . (Nevertheless, j remains accountable to i for his review

¹¹ In some societies, merely suggesting that humans can hold God accountable could be considered sacrilegious.

¹² Hence, being secular and being pro-democracy may be linked.

of k , so even in such cases one can reasonably say that i indirectly reviews k .)

With these concepts in hand, we can state the following corollary to Theorem 1.

Corollary 1. If O 's review structure is acyclic, then everyone in O who is not a leader is reviewed, directly or indirectly, by one of the organization's leaders.

Corollary 1 tells us that leaders come at a high price for acyclic organizations: although they directly or indirectly monitor the performance of everyone else in the organization, they themselves are not reviewed by anyone in the organization. This violates the meritocratic requirement of universal accountability. There is, however, a simple way to implement universal accountability: have leaders review each other. In a triumvirate, for instance, Caesar reviews Pompey, Pompey reviews Crassus, and Crassus reviews Caesar.

Although a reform turning three leaders into a triumvirate joined by a review cycle makes everyone in the organization formally accountable, it would replace the problem of unaccountable leaders by that of an unaccountable *group*.

A triumvirate's review structure is vulnerable to collusion: leaders could become oligarchs whose bad performance is reviewed only by each other. Hence, though universal accountability is satisfied, the problem of unaccountable decision-makers persists: the top group remains unaccountable to everyone else in the organization and it still controls the entire organization. A triumvirate is but one example of a self-governing oligarchy (Michels 1915) sitting atop an otherwise hierarchical organization.

Before examining solutions to this problem, we must reflect on what makes an organizational group an oligarchy. In addition to the convention that oligarchies must have at least two members—an "oligarchy" of one person is usually called an autocracy—we believe that three properties are crucial. (None of these depends on the set of specialties.) The first property is straightforward: an oligarchy rules the rest of the organization.

(1) If a nonempty group $G \subset O$ is an oligarchy, then all members of O who are not in G are reviewed by someone in G .

Note that the definition is meaningful only if G is a proper subset of O . Thus, we preclude "an oligarchy of all." All-inclusiveness obviously violates the common connotation of "oligarchy."

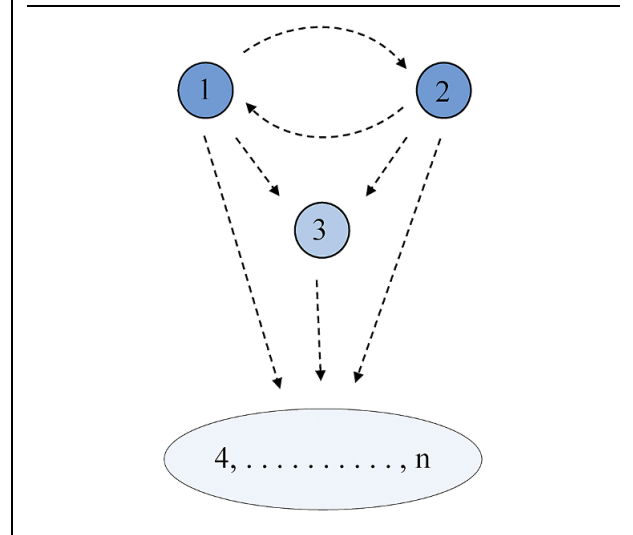
The second property of an oligarchy, also noted above, is equally obvious: oligarchs are not accountable to anyone outside their group.

(2) Nobody in G is reviewed by anyone in O outside of G .

These properties reinforce each other: together they represent oligarchic dominance. A group characterized by (1) and (2) is likely to collude at the expense of others in the organization who cannot call it to account.

However, although properties (1) and (2) are necessary for identifying an oligarchy, they are insufficient. A group satisfying (1) and (2) may include people who are reviewed by an inner clique but who cannot review

FIGURE 1. Governing Groups versus Oligarchies



anyone in the clique. They thus have little if any power. Consider a feudal farm owned by two brothers, 1 and 2, who employ a supervisor, 3, and jointly manage a set of peasants, 4, ..., n (Figure 1). The owners form the oligarchy's inner clique; although the supervisor is a member of the group ruling the organization—the group of 1, 2, and 3 satisfies properties (1) and (2)—he is not in the clique. The owners form the ruling oligarchy that controls the entire organization. (The brothers monitor each other; hence, universal accountability is satisfied. And, because nobody else reviews them, property (2) holds.) The third property refines the meaning of oligarchy accordingly.

Although the group of 1, 2, and 3 in Figure 1 satisfies properties (1) and (2), this by itself says nothing about the group's internal review structure. This is why properties (1) and (2) fail to identify a proper oligarchy in Figure 1. While the three-person group satisfies (1) and (2), so does its subgroup of 1 and 2; hence, 3, fully controlled by 1 and 2, should be removed from a proper oligarchy. 1 and 2 form the organization's true oligarchy: this set cannot be further reduced to any subset that satisfies properties (1) and (2). This minimality—the essence of oligarchy—is codified by Property (3).

(3) No proper subset of G satisfies properties (1) and (2). Properties (1), (2), and (3) together define "oligarchy" in the context of our formal model.

Definition 4. A proper subset G of O with at least two individuals is an *oligarchy* if (1) all members of O who are not in G are reviewed by someone in G , (2) no one in G is reviewed by anyone in O who is not a member of G , and (3) G is the minimal set satisfying both (1) and (2).

Apart from the convention of not calling one person who satisfies properties (1)–(3) an oligarchy—we call such a person the *autocrat* of O —and precluding $G = O$, Definition 4 imposes no size criterion on oligarchies.

Though oligarchy is often taken to mean a small group of individuals (e.g., a triumvirate), there is a good reason to eschew that property: the peril of oligarchy may persist in large cases. As Alexander Hamilton said: “Give all power to the many, they will oppress the few. Give all power to the few, they will oppress the many” (Chernow 2004, 233). Hence, although in standard political theory the term oligarchy is reserved for small ruling groups and “tyranny of the majority” for large ones, our definition ignores this distinction. At the core of our concept of oligarchy is the commonality Hamilton identified. (Social choice theorists [cf. Sen 2017, 291] do not limit the size of “oligarchy” for precisely the same reason.)

Thus, in our results, “oligarchy” applies to a group of any size. What defines an oligarchy are only properties (1), (2), and (3).¹³

Before we are ready to use the concept of oligarchy in the following results, we should note two features of oligarchies that do not follow transparently from Definition 4. First, could an organization have more than one oligarchy? Second, does the definition imply anything about an oligarchy’s internal power structure? Can oligarchs hold asymmetric positions within their group? They could certainly control different parts of the organization. These parts may but need not overlap. A diarchy may have a division of power: one oligarch controls most of the government, but the secret police is controlled by the other. Similarly, can oligarchs play asymmetric roles in the review structure?

Answers to both questions are provided by the following lemma, which states that our definition identifies an oligarchy uniquely and that oligarchs must have symmetric review relations. (Lemma 1 is crucial for proving a theorem that follows.)

Lemma 1. If G is an oligarchy in O , then:

- (i) G is the only oligarchy in O , and
- (ii) for any two members i, j of G , i reviews j if and only if j reviews i .

Having analyzed the meaning of oligarchy, we are ready to revisit the problem of accountability. A strictly hierarchical organization with a single leader is run by an autocrat. If instead of a single leader an otherwise identical organization has two who review each other, then everyone in the organization is reviewed; hence, universal accountability is satisfied. But turning from one unaccountable leader to a diarchy has little if any significance for others in the organization: they can be exploited by the unaccountable diarchy. The example’s general point is of fundamental importance to society. If a country’s military, for instance, is a hierarchy, then the top generals form an oligarchy. Coalitions of

cronies could flourish, thereby weakening accountability. Hence, it is reasonable to search for review structures that eliminate oligarchies. Doing so turns out to profoundly affect an organization’s authority system.

Given that oligarchy G is a proper subset of O and nobody in G is reviewed by anyone in O and outside of G , the following lemma is straightforward.

Lemma 2. For any set of specialties, if every pair of members of O is connected by a review cycle, then the organization is neither an oligarchy nor an autocracy.

What is much less obvious is the next lemma.

Lemma 3. For any set of specialties, if an organization is neither an oligarchy nor an autocracy, then every pair of the members of O is connected by a review cycle.

Thus, eliminating oligarchies and autocracies produces a pervasive violation of acyclicity: the organization exhibits cycles *everywhere*. From a traditional perspective, this is bad: authority systems should be hierarchical, hierarchy is inherently asymmetrical, and an asymmetric structure is acyclic. But we used the word “traditional” intentionally, to contrast it with “modern.” Holding everybody accountable (by other humans) is a modern idea, conceptually as well as temporally.

It is good to know, however, that ubiquitous cycles do the job: they are not only necessary for eliminating oligarchies and autocracies, by Lemma 2 they are also sufficient.

Together, these lemmas yield the following characterization of organizations in which all groups and all individuals are accountable.

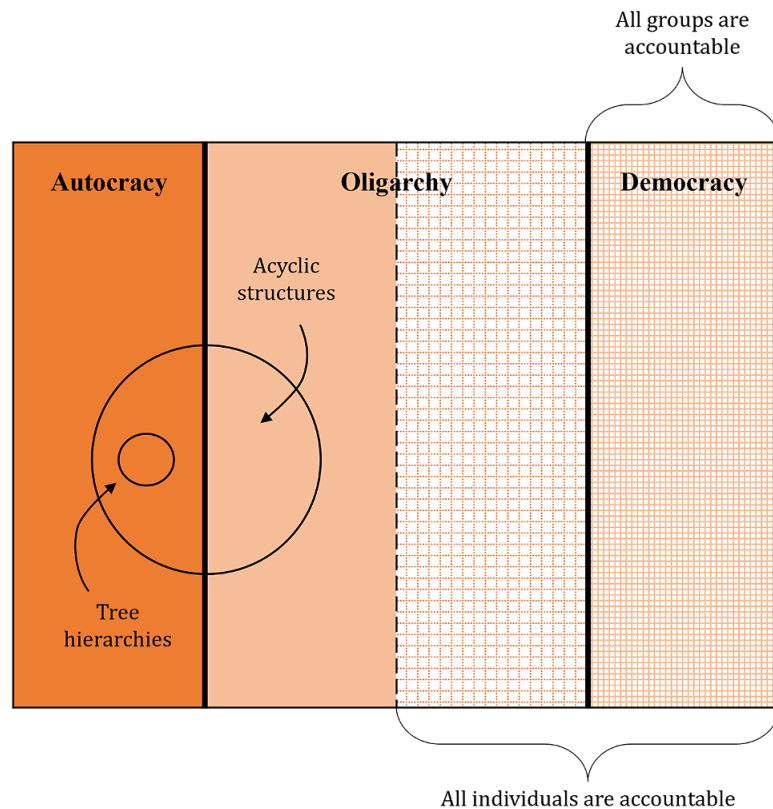
Theorem 2. An organization with any set of specialties is neither an oligarchy nor an autocracy if and only if every pair in O is linked by a review cycle.

Theorem 2 tells us that an appropriately demanding sense of performance accountability (citizens are accountable to each other—complete reciprocal accountability¹⁴) is equivalent to a vital feature of democracy: eliminating autocracy and oligarchy. And, because performance accountability is central to meritocracy, it follows that democracy and meritocracy are tightly linked.¹⁵ Thus, in this important sense,

¹⁴ Complete reciprocal accountability using just direct review is feasible only in small organizations. In institutions of even modest size, delegation and hence indirect review are inevitable. (This holds for politicians as well as bureaucrats.) Those who judge a large complex democracy as unsatisfactory on this account are imposing a utopian standard which makes the perfect the enemy of the best (Bendor 2023; Sen 2006).

¹⁵ Bell (2015) argues that what he calls “political meritocracy” can exist without Western-style democracy and that China and Singapore provide empirical support for this claim. However, in critical reviews of his book, He (2016) says that Bell’s “China model” is more accurately termed authoritarian meritocracy (a prescient remark given Xi Jinping’s autocratic tendencies) and Hui (2016) hypothesizes that meritocracy in authoritarian systems is unstable. Bell acknowledges that a problem confronting the China model is “how to deal with closed and self-perpetuating political elites” (130)—exactly the oligarchy problem identified by Michels.

¹³ For reasons noted by Michels and elaborated by organization theorists thereafter, large oligarchies are empirically unlikely. Instead, a small clique that satisfies Definition 4 will emerge. For example, consider a caste society where ethnic group A dominates ethnicity B. Group A itself will probably not satisfy Definition 4; a small clique inside A might.

FIGURE 2. Relations between Review Structures and Accountability

Note: Tree hierarchy: one leader; everyone else has exactly one superior.

democratic political institutions are modern and fully modern governments are democratic.

Together, Theorems 1 and 2 are depicted by Figure 2. (The figure displays just three review structures—autocracy, oligarchy, and democracy—because Theorem 2 implies that these are the only possible types.)

Theorem 2 points to an important tension between hierarchical authority and democracy. Specialists may insist that hierarchy (acyclicity, more generally) is essential if their organization is to do its job (e.g., defend the country) effectively. This claim is plausible when organizational efficacy requires coordinating the actions of many people or telling them to do dangerous things. This point is not limited to the military. Constraining how organizations structure their review systems may be counter-productive: constraints may not only impair organizational problem-solving; they might violate the technical autonomy of organizations expected in modern societies. Hence, the general issue is how to let organizations figure out which internal procedures and structures work well, given their tasks, while satisfying the meritocratic criterion of holding everyone in society accountable for their performance.

If a group is not accountable to anyone inside their organization, they may still be accountable to members of a different organization. Indeed, this other

organization may be created in order to review people like them. Regarding the military, a set of generals, who form an oligarchy within their hierarchical bureaucracy, may be held accountable by civilians elsewhere in the government. Indeed, a government's executive branch can be thought of as a network of organizations linked by review relations that make individuals occupying positions in one part of the bureaucracy subject to review by another part of the organization. Therefore, let us think of a government's executive branch as a set of organizations and focus on the case of the military—an organization of great historical importance which, given its coercive potential, poses vital issues for democracy. For hierarchical review structures, the following observation holds.

Corollary 2. If an organization's internal review structure is acyclic, then the performance of its leader(s) is reviewed only if outsiders do it.

Given that universal accountability is a necessary feature of fully modern systems, Corollary 2 implies that an internally hierarchical military—the prototypical form—is modern *only if there is civilian control*.¹⁶

¹⁶ The prototypical hierarchy has an autocrat. Corollary 2 covers this case since every autocrat is a leader.

(The same point holds for the police and internal security services.) In a fully modern society, everyone's performance is reviewed by somebody. If the generals succeed in preserving internal hierarchy, for which there are probably good instrumental reasons, then nobody in the military will review them.¹⁷ Hence, *only outsiders can do the job*. Of course, insiders usually regard outsiders as amateurs. They are often right. But this complaint of an organization's leaders can be self-serving: they may be trying to be the *only unaccountable officials in their organization*. If the insiders' stereotype of outsiders is correct—outsiders are, in fact, amateurs—then this fact and Corollary 2 together imply that the choice is necessarily difficult: either the organizations' leaders are reviewed by possibly incompetent amateurs or they remain unaccountable. Clemenceau chose the first alternative, famously saying, "war is too important a matter to be left to the generals." Universal accountability remains a crucial desideratum, especially for the coercive bureaucracies.

This leads directly to our next topic: the tension between accountability and specialized knowledge.

ACCOUNTABILITY, SPECIALIZATION, AND WEBERIAN TENSIONS

The tension between accountability and expertise is not peculiar to the civilian control of the military. It is a common issue in most contemporary organizations: bureaucracies (Dahlström and Lapuente 2022) as well as firms. Two reasons are as simple as they are fundamental. First, modern organizations tend to be knowledge-intensive institutions: for example, responding effectively to a pandemic requires public health departments with specialists in virology and epidemiology. Second, acquiring the necessary knowledge is costly (Gailmard and Patty 2013); it takes years of study and training (Feltovich, Prietula, and Ericsson 2018).

Further, because becoming competent in a knowledge-intensive domain is time-consuming, one cannot be a specialist in many fields.¹⁸ Complex organizations typically employ different kinds of specialists and have areas of expertise populated by some but not all of its members: for example, some military officers specialize in war on land; others, at sea.

The problem is conspicuous in cabinets where a President reviews department secretaries with specialties unfamiliar to the President. The President could try to finesse this by only selecting people with his background. For most U.S. presidents, that would restrict

appointees to people with backgrounds in law and electoral politics. But this maneuver merely pushes the problem down a level in the hierarchy. For example, Dick Cheney, a Defense Secretary under Reagan, was a career politician without military experience. Consequently, President Reagan did not have to review a secretary who had specialized military knowledge—but Secretary Cheney faced that problem. Hence, even if nobody in the Office of the Secretary of Defense had a repertoire bigger than the President's, they had to review the performance of career military specialists.

This is related to Weber's argument that contemporary bureaucracies, in authoritarian systems as well as democracies, cannot function effectively without specialized knowledge and skills—usually the province of specialists. This suggests that holding all officials accountable requires that some specialists must be reviewed by amateurs. (A now-salient possibility: the specialists are AI agents.)

We now analyze this issue formally. Consider an organization, $O = \{i_1, \dots, i_n\}$, with $n > 1$ members. For any $i \in O$, S_i denotes i 's set of specialties; for example, data scientist, helicopter pilot, and lawyer. With this framework, we can give a precise definition of situations in which hierarchical authority and the authority of expertise conflict versus those where they do not.

Definition 5. Suppose i directly reviews j . This review exhibits a *Weberian tension* if there is some specialty s such that $s \in S_j$ but $s \notin S_i$. If no such s exists, then we say that the review of j by i is free of Weberian tensions.

Obviously, i 's reviewing of j is free of Weberian tensions if both were trained exclusively in the same specialty. It is equally obvious that i 's review of j could be problematic if each has mastered one specialty which are different or if i has no specialty while j does. Hence, we begin our search for review structures that are free of Weberian tensions by examining circumstances in which everyone in O has mastered one specialty. Given that many positions require just one specialty, this is a natural starting point.

Theorem 3. If everyone in organization O has exactly one specialty, then there exists a review structure that is free of Weberian tensions if and only if everyone in O has the same specialty.

The important part of Theorem 3 is the necessity component. Government departments that have only one specialty are quite rare now. Hence, Weberian tensions are to be expected in domains where learning a specialty is so demanding that people master just one in their career.

Although many governmental positions probably require only one kind of specialized training, some (e.g., military lawyers) require more than that. Our next theorem shows that relaxing this assumption still yields a sharp result for review structures which have an autocrat.

Recall that an autocrat is in effect an oligarchy of one. Thus, i is the autocrat of O if nobody in O reviews i and everybody else in O is reviewed, directly or indirectly, by i . Tree hierarchies have these features.

¹⁷ Resistance to orders that soldiers perceive as unjustifiably dangerous (e.g., mutinies in French units after the bloody failure of the Nivelle offensive in 1917) indicates that soldiers sometimes do review their officers' conduct. This is rare however. (Remarkably, soldiers on the Western front almost always obeyed orders to advance toward lethal enemy fire.)

¹⁸ Using the estimate of 10 years of learning and training (cf. Ericsson 2018)—a necessary condition for top expertise—and assuming 50 years of work yields an upper bound of five distinct areas of high-level expertise.

The next result, Theorem 4, analyzes a relation between hierarchical authority and knowledge-based authority for review structures with an autocrat. Theorems 3 and 4 complement each other: the former restricts agents' repertoires (everyone has mastered exactly one specialty) while allowing for arbitrary review structures; the latter does the opposite.

Because Theorem 3 assumes that all agents have singleton repertoires, relations among their repertoires are simple: either i and j are the same kind of specialist, whence their repertoires are identical, or their specialties differ, so their repertoires are disjoint. Since Theorem 4 allows agents to have mastered multiple specialties, their repertoires may overlap in various ways. To create order out of this complexity, the concept of a *class of specialists* is useful.

Definition 6. We call $C \subseteq O$ a *class of specialists* if for any two $i, j \in C$ there is a $k \in C$ such that $S_i \subseteq S_k$ and $S_j \subseteq S_k$.

Several properties of classes of specialists, which are partial orders induced by the set-inclusion relation, are worth noting. First, everyone in O with the same set of specialties belongs to the same class of specialists. (Setting $k = i$ or $k = j$ in the definition implies that.)

Second, every organization has at least one class of specialists.¹⁹ Third, the set of repertoires of everyone in a class of specialists has a unique maximal element.²⁰

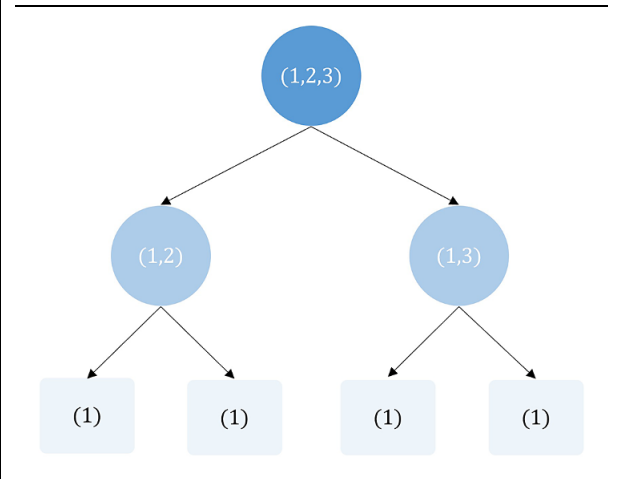
The last property implies that within a class of specialists, one can always construct a review structure that is free of Weberian tensions: let those in the class with the maximal set of specialties review everybody else in that class. More generally, follow the hierarchical structure among the agents' repertoires implied by Definition 7. Consider, for example, the seven-person organization of Figure 3. That authority structure is free of Weberian tensions because it corresponds to the hierarchy of repertoires.

Reviews *across* classes of specialists are more complicated.

Proposition 1. A review structure is free of Weberian tensions only if nobody is reviewed by someone from a different class of specialists.

Because nobody can be reviewed by someone from a different class of specialists if there is only one class of specialists, Proposition 1 matters only when there are multiple classes. In such circumstances, to avoid Weberian tensions, it is necessary (not sufficient) that agents

FIGURE 3. An Organization with a Single Class of Specialists



who belong to just one class of specialists²¹ are unaccountable to anyone in the organization who is from a different class.

Although simple, Proposition 1 identifies a property that is central to the appearance of Weberian tensions. Our next major result, Theorem 4, puts this property to work.

Analyzing review relations between classes of specialists is more complicated in the setting of Theorem 4 than in the stark world of Theorem 3. It is helpful to visualize an agent's repertoire as a bundle of specialties attached to a node, just as we have done in Figure 3. Review relations are the graph's edges; they can be constructed independently of agents' repertoires. However, for an edge to represent a review relation without a Weberian tension, a reviewee's repertoire must be a subset of his reviewer's repertoire.

Theorem 4. In the set of review structures that have an autocrat, there exists one that is free of Weberian tensions if and only if O has just one class of specialists.

For an autocrat-governed organization to be free of Weberian tensions, obviously the autocrat must have the maximal repertoire of the (unique) class of specialists. We call such an agent a *top specialist* of that class.

The important part of Theorem 4 concerns necessity. It tells us that if an organization has multiple classes of specialists, then *every* review structure with an autocrat exhibits Weberian tension somewhere.²² Contemporary governments include a wide array of specialists, from aeronautical engineers to X-ray technicians, which differ too much to be linked by the set-inclusion

¹⁹ To see this, consider any $i \in O$. Take all j such that $S_i \subseteq S_j$ and all k such that $S_k \subseteq S_i$. A set containing i and all such j 's and k 's satisfies the definition of a class of specialists. If j 's and k 's satisfying the conjectured property do not exist, then the set composed exclusively of i is a class of specialists.

²⁰ Proof: Suppose, by contradiction, that the set of specialties of m and n , S_m , S_n , are different and are both maximal. Since m and n belong to the same class of specialists, there is a member of this class, k , such that $S_m \subseteq S_k$ and $S_n \subseteq S_k$. Note that $k \neq m$ and $k \neq n$ since S_m , S_n are different and maximal. But if such k exists, then at least one of them is not maximal—a contradiction.

²¹ Agents may belong to multiple classes of specialists. For example, suppose people in O have three repertoires: $(1, 2)$, $(2, 3)$, and (2) . Agents whose repertoire is (2) belong to the class of specialists composed of individuals with repertoires $(1, 2)$ and (2) and also the class composed of specialists with repertoires $(2, 3)$ and (2) .

²² Autocratic review structures are a large heterogeneous class: some are tree hierarchies; others, not even acyclic (Figure 2).

property of Definition 7. Hence, it is extremely unlikely that such institutions have only one class of specialists. Today the necessary condition in Theorem 4 is not satisfied even by modest-sized governments. This also holds for nongovernmental organizations. Therefore, if an organization has a chief executive, *we should anticipate Weberian tensions*.

Theorem 4 is not restricted to democracies; it holds for *all* autocratic organizations. Whether a particular organization—say, a government's executive branch—is embedded in a democratic or an authoritarian polity is irrelevant: the result holds for both. Of course, the interpretation of Theorem 4 depends on the political context of the government's executive branch. Because in democracies an autocrat of the executive branch is accountable to voters, one would probably call him or her a chief executive. In contrast, an autocrat of that branch who is not reviewed by anyone outside the bureaucracy is a dictator.

With these ideas in mind, Theorem 4 implies the following corollary.

Corollary 3. In dictatorships, a government's executive branch is free of Weberian tensions only if (i) the executive branch has just one class of specialists and (ii) the dictator is a top specialist of that class.

Thus, authoritarian systems cannot evade the problems created by the review of highly specialized agents by less or differently specialized ones.²³ An important contemporary example: Putin, like Clemenceau and Wilson, never served in the active military.

The restrictiveness of Theorem 4's necessity component is revealed by the following property of a single class of specialists.

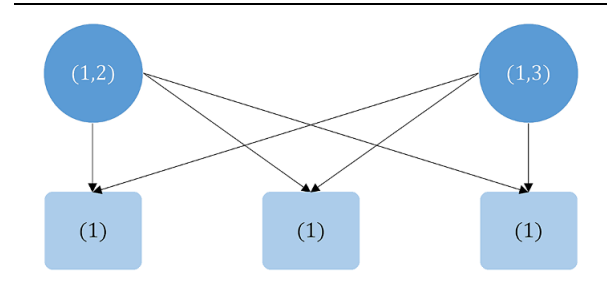
Remark 1. An organization has exactly one class of specialists if and only if someone in O has mastered all the specialties of everyone else in the organization.

Given Remark 1's restrictiveness, probably most contemporary agencies have multiple classes of specialists.

Remark 1 and Theorem 4 apply not only to entire organizations but also to their parts. Consider, for example, the Department of Health and Human Services in the U.S. executive branch. This department includes eight major divisions: for example, the Offices of Infectious Diseases, of Disease Prevention, and of Women's Health. Because each division has an autocrat, an assistant secretary, Theorem 4 holds for these units. Hence, there are no Weberian tensions inside, say, the Office of Disease Prevention if and only if this part of HHS has just one class of specialists. Similarly, Remark 1 implies that the Office of Disease Prevention has just one class of specialists if and only if the repertoire of someone in that unit equals the union of all the repertoires in that unit.

²³ This also holds for authoritarian systems that are not dictatorships, e.g., the autocrat of the executive branch is accountable to a "selectorate" (De Mesquita et al. 2004), an oligarchy outside that branch.

FIGURE 4. Review Relations without Weberian Tensions



Thus, Weberian tensions are not restricted to relations between politicians and bureaucrats: they also arise *within* bureaucracies. (Again, this holds for bureaucracies in autocracies as well as those in democracies.) Indeed, in the important special case of tree hierarchies, where every subordinate has a single superior, every subunit is headed by an official who is effectively the autocrat of that subunit. For such structures, the recursive nature of Theorem 4 becomes apparent.

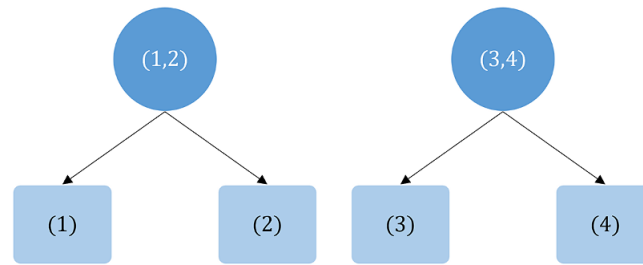
Corollary 4. If O 's review structure is a tree hierarchy, then a subunit in O is free of Weberian tensions only if that subunit has just one class of specialists.

Thus, complaints about, for example, civilian control of the military reflect only the tip of an iceberg. In modern bureaucracies, the same issue—specialists being reviewed by people who lack some of the reviewers' domain-specific knowledge—is repeated down the line, probably well into middle-sized parts of agencies.²⁴

However, Theorem 4 is confined to review structures where there is an autocrat. It does not hold for all review structures. Figure 4 provides an example. The organization has two classes of specialists: one has repertoires $\{(1, 2), (1)\}$; the other, $\{(1, 3), (1)\}$. This example shows that despite multiple classes of specialists, one can construct a review structure without Weberian tensions.

The example in Figure 4 illustrates an important property: overlapping classes of specialists. The only other possibility is nonoverlapping (disjoint) classes of specialists. Figure 5 displays an organization with disjoint classes of specialists: one is $(1, 2)$, (1) , and (2) ; the other, $(3, 4)$, (3) , and (4) . The figure shows that constructing review structures within each class of specialists that are free of Weberian tensions is easy. Making it work *between* classes is more difficult. Indeed, Proposition 1 says it is impossible. Since its review structure must be a weakly connected graph, as is required by the concept of an organization, somebody in class C_1 would have to review somebody in C_2 or vice versa. (The

²⁴ The necessary condition of a single class of specialists may be satisfied in small, technically homogeneous subunits.

FIGURE 5. Disjoint Classes of Specialists and Review Structures without Weberian Tensions

review structures in Figure 5 have no Weberian tensions, but they represent authority systems in two independent organizations.) The first two possibilities are weakly connected review structures, but both exhibit Weberian tensions: for example, if somebody in C_1 reviews anybody in C_2 , the reviewee has a specialty that the reviewer lacks.

This example leads to the next result.

Theorem 5 is based on a concept of a separable set of classes of specialists.

Definition 7. A set of classes of specialists $\{C_1, \dots, C_n\}$ is separable if these sets can be numbered in such a way that there is a k such that sets $C_1 \cup \dots \cup C_k$ and $C_{k+1} \cup \dots \cup C_n$ are disjoint.

For example, suppose organization O_1 has two classes of specialists. One class is people with repertoires of (1,2) and (1); individuals in the other have repertoires (2,3) and (3). This set of classes of specialists is separable: nobody's repertoire is in both classes. Organization O_2 also has two classes of specialists. One is composed of people with repertoires (1,2), (1), and (2); the other, those with repertoires (2,3), (2), and (3). This set of classes of specialists is non-separable: people with repertoire (2) belong to both classes.²⁵

Theorem 5. There exists a review structure without Weberian tensions if and only if the set of classes of specialists is non-separable.

Bureaucracies with multiple classes of specialists—the typical case today—which are free of Weberian tensions have some odd and possibly troubling properties. Theorem 6 identifies several of these.

Recalling that an oligarchy is defined as the minimal group whose members (1) review everyone outside the group and (2) are not reviewed by anyone outside the group makes it easier to understand the result.

Theorem 6. If O has multiple classes of specialists, then the following properties hold for all review structures that are free of Weberian tensions.

- (i) Every such review structure is an oligarchy.
- (ii) If a top specialist i is reviewed, then all of i 's reviewers must be top specialists from i 's class of specialists.
- (iii) There exists a group that contains all of the top specialists in O whose members (1) review everyone outside the group and (2) are not reviewed by anyone outside that group.
- (iv) Every oligarchy without Weberian tensions includes at least one top specialist of every class of specialists.
- (v) The smallest oligarchies consist of exactly one top specialist from every class of specialists.

Considering that contemporary bureaucracies typically have multiple classes of specialists, Theorem 6 establishes that avoiding Weberian tensions exacts a heavy price: an oligarchy governs the organization. The oligarchy is a coalition of guilds: every class of specialists has at least one “representative”—a top specialist of that class—in the governing coalition. Moreover, the absence of Weberian tensions implies, via Proposition 1, that *these representatives of different guilds are not accountable to each other*. Nor are they accountable to an autocrat: Theorem 6 assumes that O has multiple classes of specialists, yet its review structure is free of Weberian tensions, a combination which precludes autocracy (Theorem 4). Thus, the plans of different classes of specialists can be at cross-purposes. (In World War II, the Japanese army and navy had sharply different war aims which were never reconciled.) This is coordination failure on a grand scale. It is not an effective way to run large complex bureaucracies.

An oligarchy could appoint an administrator with the authority to coordinate the classes of specialists below him and who would be accountable to the oligarchy. This is approximately the structure of publicly traded corporations (the chief executive officer is formally accountable to the corporate board) and of U.S. cities which have a top manager accountable to the city council.

But this structure cannot evade the constraints identified by Theorem 4. A city manager with that kind of authority is in effect an autocrat of most of the city government: she reviews all the bureaucrats. Hence, Theorem 4 holds for this part of the organization. Therefore, its review structure is free of Weberian tensions *only if* that part of the organization has just

²⁵ We use the convention that the empty set is a subset of every non-empty set. Hence, someone without specialties is in every specialized class. Consequently, if O has such people, then the set of O 's classes of specialists is non-separable.

TABLE 1. Which Review Structures Exhibit Weberian Tensions?

	Homogeneous Repertoires	Heterogeneous repertoires, single specialty class	Multiple specialty classes
Autocracy	¹ None	² Some	³ All
Oligarchy	⁴ None	⁵ Some	⁶ Some
Democracy	⁷ None	⁸ All	⁹ All

Note: None: No review structures in this cell exhibit Weberian tensions. Some: Some review structures in this cell exhibit Weberian tensions. All: All review structures in this cell exhibit Weberian tensions.

one class of specialists and the city manager is a top specialist of that class. Thus, the problem cannot be finessed by creating a role of top administrator.

Finally, Theorem 6 has implications for authoritarian systems that are ruled by a group (a situation not covered by Corollary 3). By Theorem 6, if a government's executive branch has multiple classes of specialists and is free of Weberian tensions, then it is run by an oligarchy. Hence, if this group is not accountable to anyone outside the government, then it is accountable to nobody. This is an authoritarian system, governed by a group. On the other hand, if the executive branch's oligarchy is accountable to a mass electorate, then Weberian tensions must appear. This trade-off is inescapable.

Table 1 summarizes what we know about the appearance of Weberian tensions, depending on the type of review structure and the distribution of specialized knowledge in O . (The table's cells are mutually exclusive and collectively exhaustive.)

The leftmost column represents the simplest kind of distribution of specialized knowledge: everyone in the organization has the same specialty. Obviously, therefore, Weberian tensions cannot appear in any review structure in cells 1, 4, and 7. These tensions become more common as we move from left to right in the table, that is, as the knowledge structure becomes more complex.²⁶

Although Table 1 gives a useful overview, its cells report only qualitative information about the frequency of Weberian tensions. Our last major result provides quantitative information about all possible

organizational categories except for oligarchies with non-separable classes of specialists.

Theorem 7. For any organization with $c > 1$ classes of specialists, the following hold.

- (i) If the review structure is an autocracy, or an oligarchy with separable classes of specialists, then it has at least $c-1$ Weberian tensions.
- (ii) If a review structure is a democracy, then there are no Weberian tensions if agents' repertoires are homogeneous, and at least c Weberian tensions if repertoires are heterogeneous.

Thus, for these types of review structures, the new knowledge or skills embodied in new classes of specialists strictly increase the minimal number of Weberian tensions exhibited by the authority structure. This is a sharp statement about the relation between specialized knowledge and problematic performance reviews.²⁷

Theorem 7 points up an important difference between autocracy and democracy. If O has only one class of specialists, then by Theorem 4 one can construct an autocratic review structure that is free of Weberian tensions. This is not, however, generally true of democratic systems. The reason is fundamental. The structure of a class of specialists with heterogeneous repertoires is inherently asymmetric. In contrast, democratic review is inherently symmetric: all citizens in such systems are connected by review *cycles* (Theorem 2). Napoleon's regime is a good example of these structural differences. Under him the French military was much more meritocratic than it had been in the Ancien Regime and Napoleon warranted being at the top of a military prestige hierarchy, but as Emperor he was unaccountable.

²⁶ Because cells 1, 4, and 7 are obvious, no proof is required. Cells 2 and 3 are established by Theorem 4. Cells 8 and 9 follow from Proposition 1. Cell 6 follows from the combination of Theorems 5 and 6. Finally, cell 5 is proven as follows. Because there is only one class of specialists yet repertoires are heterogeneous, some agents are not top specialists. Therefore, a review structure without Weberian tensions can be constructed by following this rule: i reviews j if and only if $S_j \subseteq S_i$. To construct a structure with Weberian tensions, simply reverse the review arrows in the graph of the first structure.

²⁷ Part (i) of Theorem 7 implies Theorem 4. We have retained the latter as a separate result because it is useful as stated and is easier to understand.

Different Kinds of Weberian Tensions

Weberian tensions come in different flavors and intensities. In particular, the quality of information about a reviewee's performance varies substantially across different positions. Consequently, some reviews require a complex mix of qualitative and quantitative analyses, which must be done by specialists while others use just one simple numerical index of performance and do not require a specialized review.

Using quantifiable performance measures as an evaluation tool may have become an important ideological trait of many regimes. A scholar who, together with a growing number of other academics, examines the use of quantification in contemporary China has argued that quantification is a core of "technocratic neoliberalism, which pervaded post-Cold War governance under democratic and nondemocratic political systems alike" (Wallace 2023, 9).²⁸

The issue of quantification is related to a more general problem of the quality of performance information. For example, there is more high-quality information about the performance of a VA hospital than there is about the State Department. Hence, reviewing the performance of the director of a VA hospital is easier than is reviewing the performance of the Secretary of State.

The following definition addresses this phenomenon. For simplicity, it dichotomizes the quality of performance information: either it is high quality or it is not.

Definition 8. Suppose the review of j by i exhibits a Weberian tension. We call the tension *easy* if high-quality information about j 's performance is available and *hard* otherwise.

"Easy" should be understood in a comparative sense: doing a competent review is easier if high-quality information about the reviewee's performance is available than if it is not.

We assume that the availability of high-quality information depends on a reviewee's set of specialties. We also assume that if such information does not exist for a specific set of specialties, then it does not exist for any superset of these specialties.

The idea of hard versus easy Weberian tensions leads to our last result.

Proposition 2. If some members of O acquire specialties which are new to the organization, that is, those which are not in S , and otherwise O remains unchanged, then for all review structures there are at least as many hard Weberian tensions in the new organization as in the old one.

If an organization's objective were to minimize the number of problematic reviews, then Proposition 2 tells us that the new organization cannot be better than the old one.

It also indicates that, moving from low to high on the specialization-diversity spectrum requires (weakly) increasing amounts of high-quality information to ensure that most cases of Weberian tensions are easy. In a maximally specialized organization, everyone has a distinctive specialty and forms a separate class of specialists. Hence, all Weberian tensions are easy only if there is high-quality information about the performance of every reviewee in O . In a minimally specialized organization, everyone has the same repertoire. Then no review structure produces Weberian tensions; hence, avoiding hard tensions requires no high-quality performance information whatsoever.

Dynamically, then, there may be an arms race between two kinds of knowledge: that embodied in specialties and information about the performance of agents. The net effect of this arms race on the frequency of hard Weberian choices is unpredictable.

One could similarly extend the present model to depict different kinds of review relations. For example, although Congress can impeach Supreme Court justices, such events are rare. In contrast, career bureaucrats in developed countries are routinely reviewed more often. These differences probably affect the accountability of the officials in question. Another notable example is the review of citizens by police. Although a latent accountability exists for most people, a person could go her entire life without the threat of active review being realized.²⁹ (Interestingly, in police-citizen interactions reviewees are usually amateurs and reviewers, specialists. This is the opposite of the Weberian tension we have examined.)

We are confident that graph theory can *represent* a wide variety of review relations—defining different kinds of \rightarrow is straightforward—but deriving results analytically will become more difficult. Hence, for certain problems, other methods such as computational modeling may be appropriate.

Executive Branch Autocrats and Elections

By definition, an autocrat is unaccountable to anyone in his organization. In politics, this problem has well-known institutional solutions. One is to hold the autocrat of a government's executive branch accountable, either directly (presidential systems) or indirectly (parliamentary systems), to voters via elections. This solution connects democracy and bureaucracy by a network of review relations where performance accountability runs through the entire system. Hence, meritocratic bureaucracy and competitive elections together form a system where every person and every group are accountable to somebody (Theorem 2).³⁰

Some might view this system as unsatisfactory because it makes professionals (career politicians) accountable to amateurs (voters). The factual premise

²⁸ We thank an APSR referee for suggesting that we examine this issue and for pointing out its recent prominence in the literature on Chinese political economy.

²⁹ We thank an APSR referee for raising these intriguing issues.

³⁰ Theorem 2 allows for systems that include horizontal accountability (O'Donnell 1998): checks and balances produced by institutions such as an independent judiciary.

is indisputable: decades of empirical research have shown that many voters know little about policies, parties, political candidates, or how government works. But the evaluation, based on the false belief that Weberian tensions can be avoided or that they affect only the relation between voters and politicians, is misguided. Theorems 3–7 indicate that Weberian tensions exist throughout modern governments, including deep inside the bureaucracy. *Eliminating them is either impossible or extraordinarily costly.* Doing so would deprive governments of the diverse kinds of specialized knowledge required to routinely supply clean drinking water, control pandemics, and provide national security in a world of nuclear weapons and cyberthreats.

Combining accountability and expertise is intrinsically difficult. Accountability tends to open things up: what matters are the interests impacted by a decision-maker's actions. Expertise, because it is invariably specialized, tends to narrow things down. These two tendencies conflict. Indeed, the results of our last section imply that in today's world, designing systems that combine accountability and expertise in ways that are free of Weberian tensions is impossible. *Some design-aspirations must go.*

Moreover, because knowledge has become much more specialized, this tension has intensified. Washington's first cabinet, for example, had only four members: the Secretaries of State, Treasury, and War, and the Attorney General. The main specialized backgrounds of Presidents then were law, the military, finance, and diplomacy. Though no president had mastered all four, many had background in several. Today the U.S. cabinet has 24 members. Law, military, finance, and diplomacy still exist, but so do energy, epidemiology, and macro-economics. But this institutional trend is not reflected in the biographies of individual Presidents: contemporary U.S. political leaders acquire about the same number of specialties on average that they acquired in 1800 (data on the professional backgrounds of all U.S. presidents available upon request).³¹ This makes sense. It still takes years for a person to become competent in law, the military, finance, or diplomacy. Indeed, it may take longer now: there is more to learn in each of those fields. But how fast an individual learns (e.g., reading speed) has probably changed relatively little. Thus, because of cumulative cultural evolution (Henrich 2016), the gap between a society's total cognitive repertoire and the repertoire of anyone in that society has widened enormously in the last two centuries. For example, Steven Chu, Secretary of Energy under Obama, is a PhD physicist, with a Nobel in that field. In the 1790s, there were no PhDs in physics—or anything else. Washington never had to review a

subordinate whose expertise in a certain domain so far outstripped his own.

CONCLUSION

Democracy and meritocracy are intertwined. Theorem 2 shows that a fully meritocratic system, where all individuals and groups are held accountable, must also be democratic in that for any individuals i and j there is a review cycle between i and j . In contrast, a meritocratic authoritarian system is a hybrid: everybody below the ruler or oligarchy is accountable for job performance but the top decision-makers are not reviewed. What justifies their being exempt? Not their cognitive abilities. As far as is known, all normal humans have the same basic processes of reasoning and judgment (Anderson 2010; Kahneman 2011). Hence, advocating, as Enlightenment monarchs were wont to do, that meritocratic review should be imposed on *everyone but them* means carving out an unwarranted exception. A comprehensively meritocratic system prohibits exceptions: the performance of *all* decision-makers, individuals and groups, is reviewed. Thus, contrary to what some critics of democracy (e.g., Bell 2015) have argued, a comprehensively meritocratic system must be a democracy.

However, this picture is complicated by the possibility that some performance reviews are problematic: a reviewee knows more about her tasks than does the reviewer. Indeed, Weberian tensions are more than a possibility; for several interlocking reasons, they are now *inevitable*. Modern bureaucracies are knowledge-intensive organizations. They must be staffed by specialists: there is no other known way to get a lot of domain-specific knowledge into someone's head. And, because learning a specialty takes years of education, training, and experience, modern bureaucracies contain many different specialists. Given these strong empirical regularities, Theorems 3 and 4 tell us that avoiding Weberian tensions is essentially impossible. Thus, the belief that the leader of any complex bureaucracy (e.g., a government's executive branch) could have mastered the specialties of all of his subordinates (Theorem 4) is a fantasy. And, as we have emphasized, *this argument holds for authoritarian systems as well as democracies.* Weberian tensions cannot be evaded by an autocrat or an oligarchy. Such decision-makers can wield enormous power, but their basic cognitive capacities—including how many specialized bodies of knowledge they can master—are like everyone else's.

This analysis suggests that voters in democracies have been unduly criticized. To be sure, most voters are amateurs about most public policies and how these are produced by sequences of elections, legislation, and bureaucratic administration. But this lack of expertise is ubiquitous in modern societies. Today *everybody* is an amateur in almost all complex domains (Sloman and Fernbach 2017).³² This holds for the heads of the

³¹ This also seems to be true for British and French political leaders over the same time period (thumbnail descriptions of their background available upon request), with one exception: French kings had less specialized training than chief executives in Republican France have had.

³² This follows from four facts: (1) expertise is domain-specific, (2) modern societies have a great many domains, (3) acquiring

government's executive branch in regimes of all kinds. It holds for department secretaries. It probably holds deep into the guts of bureaucracies: throughout modern agencies are specialized pockets of knowledge; superiors cannot master it all. Performance review by nonspecialists is common in modern systems, authoritarian as well as democratic. The key issue, identified by Theorem 2, is whether any person or group should be shielded from the harsh glare of performance review. Research on cognition and judgment provides no justification for such exemptions.

Admittedly, bureaucracy continues to mean hierarchy, and hierarchy, despite its ongoing usefulness (e.g., in coordinating collective action), smacks of unaccountable top officials. In democracies, however, this involves locally acyclic authority structures: department heads reviewing their subordinates and so on. Globally, democratic elections and meritocratic bureaucracies together produce pervasive cycles of accountability.

Democracies need bureaucracies to get things done, and they are done better if agencies are meritocratic. Hence, democracy and modern bureaucracy is not a shotgun marriage. They are a coherent system.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <https://doi.org/10.1017/S0003055424000315>.

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CONFLICT OF INTEREST

The authors declare no ethical issues or conflicts of interest in this research.

ETHICAL STANDARDS

The authors affirm this research did not involve human participants.

expertise in knowledge- or skill-intensive domains takes years, and (4) our lives are relatively short.

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