Design Science

An Introduction to Radical Biocracy: A relational, autonomous approach to decision-making towards emergent and symbiotic design

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Abstract

Any system health work must look at decision-making because decisions propagate throughout a system, shaping system dynamics. Usually, human decision-making is conducted from an individualist, objectivist perspective. What happens when we use an approach based on the radical relationality of Radical Participatory Design and Relational Design? This is the fourth paper in a series of papers which introduced Radical Participatory Design in the first two papers and Relational Design in the third paper. In this fourth paper, we explore the decision-making dynamics in Radical Participatory Design and Relational Design projects.

We use the term political ecology to speak about the power dynamics within any ecological system – a geographical population, a community, an ecosystem, and so forth. We analyze the political ecologies of individualist decision-making models. Then we explore how to embody a relational ontology within decision-filled human ecosystems and how a relational way of being changes decision-making. Referring to biology, we discuss ingredients for relational decision-making – relationality, emergent design principles, and autonomy. Those ingredients can lead to emergent and symbiotic design. Emergent design refers to design that emerges from consistently following a few basic principles. Symbiotic design occurs over time when deeply, relationally embedded entities retain autonomy and indirectly evolve to create a design that would not have occurred through an intentional design process. We then introduce Radical Biocracy as a type of decision-making model where decisions are not deliberated by groups or team members but emerge from the relationally autonomous choices and actions of individuals.

Keywords: Emergent design, Symbiotic design, Biocracy, Decision-making, Relational autonomy

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1. Introduction

I inhabit multiple spaces of privilege and lack of privilege. I am a Black, disabled Nigerian in the US from an immigrant family. I'm also a cisgender, male, heterosexual, Christian U.S. American. I am from the African indigenous people group Ibibio, and my name, *Anietie*, is a shortened version of the question "Who is like God?" When I work from an indigenous perspective, I tend to work from an African indigenous lens, which is different from indigeneity in North America or Australia. Both pluriversal and colonial ways of being are inside of me. In all my work, I try to work towards the relational parts of me and the worlds I inhabit in a way that

peacefully coexists with other worlds and systems. Sometimes, peace means dismantling harmful systems.

Systems are made up of interrelated forces, things, and elements that interact in a way to produce a system purpose or function (Meadows 2008). A common misconception in systems is that the system purpose emerges without any individual element or thing intending that purpose (Meadows 2008). In reality, in multiple socio-human systems, there are individual humans with power who intend for the system to function the way it functions. In fact, in socio-human systems, the main reason we do systems change work is because all of the humans, especially those with power, in the system are not aligned to the purpose for which we hope. If they were, there would be no need for the systems change work because our thoughts, actions, behavior, and patterns would arise from our common hopes, dreams, metaphors, mythologies, worldviews, and purpose (Inayatullah 1998).

The decisions humans make in a socio-human system, therefore, have a profound effect and impact on themselves, others, and the environment. Yet, the politics of decision-making remain an underdeveloped or neglected part of systems change work. In this paper, I focus our attention on the politics of decision-making.

However, I want to go beyond analyzing and thinking only of the politics of decision-making towards a political ecological perspective on decision-making. Political ecology has been used to mean the intersection and interrelatedness of politics, economics, and society with environmental or ecological issues, changes, and impact (Watts 2017; Robbins 2019). Political ecology brings to the forefront the political dimension of environmental and ecological issues (Forsyth 2003). Here, I use the term political ecology to hint at how various components analogous to water and soil can be politically nurtured in a landscape of decision-making and how decision-making can emerge and grow from those nurturing ingredients, similar to life in an ecological landscape.

This paper is the fourth in a series of RPD papers in which the first two papers introduce RPD while the third explores a subset called Relational Design (RD). This fourth paper explores the decision-making dynamics often found in RPD and RD teams. First, I offer pictures or snapshots of a decolonized history of group decision-making to highlight that multiple of our group decision-making processes are ancient. Then, I use an RPD framework to analyze different decision-making models. After analyzing those decision-making models using the RPD power analysis, we discuss how we might base decision-making on relationality instead of individualism by exploring three key ingredients – various forms of relationality, autonomy, and emergence. Then, I share a relational decision-making approach called Radical Biocracy, that emerges from relational autonomy, producing a type of emergent or symbiotic design. We discuss challenges moving to a Radical Biocracy before ending with concluding remarks highlighting the examples of Radical Biocracy to come in the fifth paper.

2. Glimpses from a decolonized history of group decision-making

Creating a universal, linear, chronological, developmental, teleological history is an act of colonial world-making (Smith 2021). Instead, I want to counter the mythology of anthropocentric and colonial histories of group decision-making that fail to

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recognize how ancient our group decision-making models are. Let us examine examples of voting and consensus in pluriversal histories.

Consensus is a type of collaborative decision-making process that respects both the group and the individual (Horn-Miller 2013). It is not unanimity; consensus, instead, implies that everyone has reached a point where they agree with a decision, even if it is not their first choice. Historian Andy Blunden has written that an older version of consensus emerged with Quakers after the English Revolution in the late 17th century, while consensus in its modern form was introduced by the Student Nonviolent Coordinating Committee (SNCC) during the 1960s U.S. civil rights movement and the 1960s Women Strike for Peace (WSP) anti-war movement (Blunden 2016). However, there are multiple examples of consensus decision-making before the 1960s and the late 17th century.

Various pre-colonial Indigenous groups used consensus decision-making. For instance, Haudenosaunee First Nations engaged in democratic, collaborative decision-making in which consensus was not about persuasion or compromise but about the journey and methods of finding solutions and reaching consensus (Horn-Miller 2013). For the Haudenosaunee, consensus represents a balance between the individual and group, not because of competition between individual rights and group rights but, rather, due to the interdependence and interconnectedness of individuals to the group. If someone objects to a potential decision because they believe it is not in the best interest of the group, they can provide another option or help explain (Horn-Miller 2013). The group then tries to find a solution or decision that works for everyone. At the same time, everyone is offering solutions or objecting based on the collective good. This interplay makes all consensus decision-making a process that strengthens bonds and relationships each time the community engages in decision-making.

Similar to Haudenosaunee First Nations, various pre-colonial African Indigenous groups used consensus as well. Blunden mistakenly labels the precolonial Indigenous "African consensus" as a type of counsel decision-making process and not consensus because, in multiple cases, a chief seems to make the decision after hearing from different people (Blunden 2016). Blunden, however, misunderstands three characteristics that make it a consensus for those of us in Indigenous African nations. First, the chief is only helping to decide in decision-making across a region involving multiple villages where participation of every adult or adult male is impractical (Ibibio, Generations; Uyanne 1994). In those cases, every village, family, or clan has equal representation regardless of size or resources. In contrast, there are many decisions made at the village, family, or clan level that do not involve the chief of a region or collection of villages. Second, during chief-facilitated regional decisions, every representative speaks. It is not a question of who will speak; it is only a question of when (Ibibio, Generations; Uyanne 1994). This is the same for decisions at the village level. In authoritarian counsel-based decision-making, usually the authority decision-maker only hears from a subset or a select few. Third, in situations with a chief, the chief is deciding for the collective good, not just balancing various viewpoints but making a decision to meet all needs (de Liefde 2007). Chiefs had no authority to impose their will unilaterally; remember, chiefs and leaders could be deposed for poor governance (Hammond-Tooke 1991; Horn-Miller 2013). Finally, as a result, the chief's decisions and the process had to be accepted as well. Therefore, various precolonial African indigenous

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governance models were participatory and consensus-based (African tribes, Centuries; Mengisteab 2019).

Even a holacracy is not new. A holacracy is a governance system of autonomous or semi-autonomous and self-regulating groups of people that are interrelated and dependent on broader autonomous units (Liebert 2020). Contrary to the idea that it was created by Brian Robertson in the late 2000s, a holacracy is the same structure of concentric participatory, consensus-based governance circles in precolonial Indigenous groups on multiple continents, building from the family to the clan and village to the region or village-group (African tribes, Centuries; Uyanne 1994; Badal 2007; Horn-Miller 2013).

We can even see egalitarianism in early humans in the same genus, like Neanderthals. Neanderthals lived in bands in which people had equal decision-making power, with no one wielding power over all the others (Venkataraman 2022).

Consensus is even found in both early humans and animals, such as in situations where groups have to move, migrate, decide where to go, hunt, forage socially, find new homes or nests, cooperatively breed, and more (Conradt & List 2009; King & Sueur 2011). For example, honeybees use a quorum-based consensus decision-making model when deciding on a new nest site after outgrowing the current one (Kameda *et al.* 2012). The queen takes two-thirds of the worker bees, roughly 10,000 bees, and they leave and temporarily settle on a tree branch while a few hundred scouts go to look for potential sites. The scouts come back and advertise the sites they found by performing a dance. Better sites are advertised with stronger, longer dances. Scouts that have not yet flown or have stopped dancing view the dance of other scouts and are more likely to visit better advertised sites themselves. This builds a positive feedback loop. Eventually, when enough scouts have approved the same nesting sites, scout bees use a special wing-beat signal alerting all bees to warm up their wings in preparation to fly to the new site. Everyone agrees and goes. This quorum-based consensus is observed in other animals as well such as ants, termites, fish, etc.

Majority voting behavior can be seen in social primates. For example, Tonkean macaques use majorities to collectively decide what direction to take after finishing a resting period (King & Sueur 2011). A macaque indicates a direction of travel after resting by moving in that direction and looking back to the rest of the resting group. Usually individual macaques that move away from the group move in the same direction. A minority of the time, individual macaques might move in two different directions. Macaques in the resting group wait for a quorum threshold of macaques, indicating the group should move in both directions. Then, the group decides which direction to go based on which direction has a majority of individuals encouraging the group to move there. Voting can be seen in early humans and other primates as well (Boyd & Richerson 2009; King & Sueur 2011). In various animal groups, body postures, vocalizations, and movements function as votes, and groups make decisions using the majority rule, an intensity threshold, or even averaging techniques (Kameda *et al.* 2012).

These types of mechanisms for collective decision-making, whether majority voting or quorum consensus, are and were common across many social primates, including early human ancestors in the Pliocene period through today (Boyd & Richerson 2009; King *et al.* 2011; Tindale & Kameda 2017). Democracy did not start in Ancient Greece, as collective decision-making has always been an aspect of social groups of animals working collectively toward shared goals and survival

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(Conradt & Roper 2007). Such collective decision-making, including consensus, is ancient and does not even require sophisticated or modern language (Kameda *et al.* 2012). As long as groups lived and worked together, shared goals, and communicated in some way, shared decision-making like consensus or voting has always been a part of life. Using RPD, let us analyze various decision-making models to discern their shortcomings that might lead us to a new biocratic model of decision-making.

3. Analyzing decision-making models

RPD is not research and testing participation, a method, a way of doing a method, or a methodology. RPD is a meta-methodology or an approach that can be used with any methodology (Udoewa 2022a, 2022b). The word "radical" comes from the Latin root "radix" meaning root. RPD is a design that is participatory "to the root," all the way down, completely, fully, from top to bottom, beginning to end, A to Z. There are no meetings, calls, planning, or debriefing without community members because they are full-fledged members of the research, design, development, and implementation team.

In RPD, community members fully participate and fully lead. Community members also outnumber the professional researchers and designers. Lastly, community members own the outcomes, data, and artifacts, as well as the narratives and stories around the outcomes, data, and artifacts of the work. Instead of the designer-as-facilitator model, RPD decenters the professional researchers and designers and uses the designer-as-community-member model, community-member-as-designer model, and community-member-as-facilitator model (Udoewa 2022a, 2022b; White *et al.* 2023).

In RPD, we ask three questions. Who is initiating? Who is participating? Who is leading (Figure 1)? The answer to these questions can change over time and place in a design journey. We can visually graph how expansive or inclusive initiation, participation, and leadership are for various types of designs, including community design, community-driven design, RPD, and Colonial Participatory Design (Udoewa 2022b). This RPD three-question framework can be used to analyze power dynamics in the decision-making models and options available when any group of people come together, especially a group of people in a design journey.

3.1 Authoritarian decision-making

In the authoritarian, dictate, or decide model, the executive or team lead makes the decision with no input. The initiation of the decision can vary between the lead initiating and a team member initiating. Because the lead is always involved in initiation and can decide not to make a decision when a team member attempts to initiate, at most there is joint initiation. The lead is the only person who participates and leads the decision-making.

Individual consultation and group consultation are two other versions of authoritarian decision-making in which leadership, and initiation remain the same. The only difference is that in individual consultation, an extra person participates by advising, though not leading, and in group consultation, extra people participate by advising the lead. If the size of the consulting group is the size of the team, there is equal participation, though not equal leadership.

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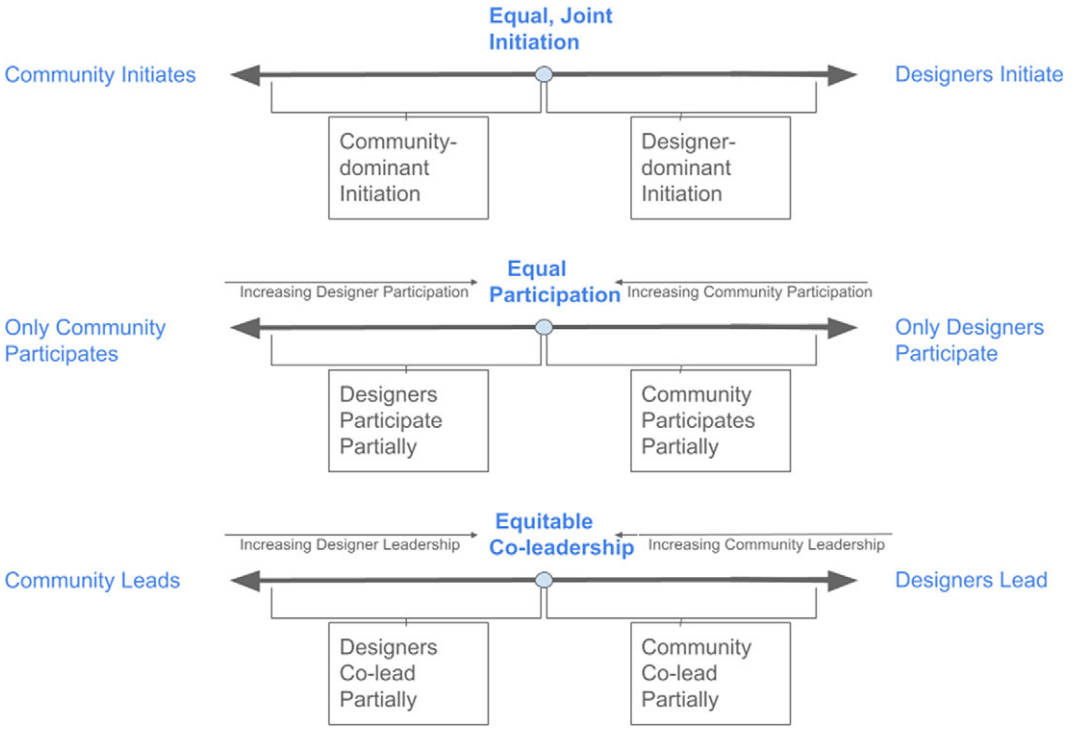

Figure 1. Three axes of participation: initiation, participation, and leadership.

In delegation, the lead still initiates by choosing or allowing a decision to be delegated to a person, group, or subcommittee. The lead sets the constraints and scope of the delegated work. Participation may include the lead and one delegated person, and can extend to the entire team if delegated to the team. Though the delegated person or group makes the decision, the lead sets the constraints and bounds of the decision-making; the lead might even reverse the decision. Therefore, the decision can be led by the delegated team alone or can be considered a mix of the team and the lead.

3.2 Voting

When using voting as the decision-making process, the majority, supermajority, and plurality models demonstrate similar dynamics between different groups. Regardless of how a decision is initiated, everyone in a group participates. Using majority rules, the majority leads or makes the decision alone over choices with a minority; with supermajority rules, the supermajority decides alone over the choices with sub-minorities; using plurality rules, the plurality decides alone over other groups of smaller percentages.

The unanimity model has the same dynamics for initiation and participation: anyone can initiate, and everyone participates. To what extent the majority decides or leads, depends on the specific unanimity model. Unanimity requires everyone to agree for a vote to pass; unanimity minus "x" means a vote can pass if no more than x persons disagree or vote against an option. One person with a minority choice

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cannot lead the decision. However, one person can stop a vote in the unanimity model; two can stop a vote in the unanimity minus one model; three in unanimity minus two; and four, unanimity minus three. Moving from unanimity to unanimity minus three, the majority has increasing decision-making power, or leadership because a smaller majority is required as the x increases in unanimity minus 'x,' especially in smaller groups.

When voting is done through representatives instead of directly through populace voters, minoritarian rule, or rule by the minority, can occur. Minoritarian rule through voting occurs when voting representatives disproportionately favor the populace minority. Though everyone participates indirectly through representation, the minority makes the decision.

When voters are choosing a numerical option, central tendency can be used to decide the vote. The central tendency of the voting data is usually interpreted as the mean, mode, or the median. Anyone can initiate, and everyone participates. When using the mean, the average decides, but outlier votes have a stronger effect on the mean than on the mode or median, which both can sometimes be unaffected by outliers. When using the median, the middle decides. The most common vote decides when using the mode. There are ways groups can join together, especially majority groups, and exert power over others in order to affect the outcome, like choosing the same numerical option to force the mode or median to their goal.

3.3 Option voting

All previously described decision-making models apply in situations where you are voting on a single option or between multiple options. The following models apply when deciding between multiple options.

Dotmocracies, or dot-voting, are commonly used in design team processes. Dotmocracies are simple, quick, engaging, less demanding than ranking all options, and flexible enough to allow multiple preferences. However, they can cause choice overload, which often leads to facilitators grouping unique ideas into general categories and losing specificity (Chernev, Böckenholt, & Goodman 2015). When equivalent ideas are not grouped together, vote-splitting occurs. New options cannot be fairly added after voting has started without being unfair to earlier options. Cheating can occur, especially in online dot-voting, if participants add, remove, or move dots. Voters may simply add their dots to the same options they see others have chosen before them, the bandwagon effect (Farjam 2021). Lastly, dotmocracies treat broadly popular options the same as options enthusiastically supported by a minority.

In range or score voting, each voter assigns a score to each option, representing the level of preference. The option with the highest total or average wins. In ranked choice voting, each voter ranks some or all options. Then the winner may be decided by points assigned to options based on the rankings (positional systems), through successive rounds of elimination (instant-runoff-voting), by using a matrix of paired option comparisons to see which option is most often favored over the other options (minimax or Copeland's method), etc. (Copeland 1951; Levin & Nalebuff 1995; Saari 1995; Robert III *et al.* 2020). In score and ranked choice voting, anyone may initiate; everyone participates. Whether or not the decision is led and made by the majority depends on the method used to determine the winner, the method used for runoff voting, the entry of options with no real possibility of winning, and the

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amount of tactical collusion between individuals and groups. However, if a group of like-minded voters in the majority worked together, they may have the ability to decide the winner. There are many more ways for a group to choose one option among many, like quadratic voting, which factors the strength of each preference, and to determine the winning option after scoring and ranking. Groups may even create new algorithms or use a randomizing algorithm (McComb, Goucher-Lambert, & Cagan 2017).

3.4 Holacracy

A Holacracy is a management and governance structure that creates a hierarchy of self-regulating and autonomous, yet dependent, units (Liebert 2020). Units are accountable to broader, encompassing units, creating a hierarchy. Internally, however, units can self-govern, using a specified process called "integrated decision making" to make governance changes. Integrated decision-making is neither consensus nor consent but takes into account proposed changes and objections, making sure any changes are rooted in the needs of a role within the unit. Individuals in units are free to make any decision they want to fulfill their role as long as it does not violate governance policies or rules and does not spend organizational assets without permission (Work 2015).

In integrated decision-making, anyone may initiate, anyone can participate through the proposal or objections. Integrated decision-making still requires someone to make a decision while taking into account the proposed changes and objections. Although this person is trying to make the best decision for a role, not for any particular individual, this decision-maker still has more power over the rest of the team.

3.5 Consent-based and consensus-related decision-making

In consensus, the goal is to find an option that everyone might not prefer as their first choice but which everyone is willing to support. This is usually achieved through deliberation, negotiation, or conversation ending with a vote to determine if consensus is reached. Anyone may initiate everyone participates. However, a minority has the power – even one person – to stop a decision from passing. A minority cannot pass a decision, which would imply full leadership, but a minority can stop a decision from passing.

Consensus can be quite difficult to achieve depending on the group and the political ecology or hierarchical relationships and dynamics. It can require one or more people to be willing to step aside and let go of their first or preferred choice to agree to what others are preferring. Such a process is highly dependent on relationships, trust, relational history, the amount of shared vision and goals, forgiveness, and above all time. Dealing with such challenges in radically participatory processes is discussed in the first three papers of this series.

One method certain groups use to achieve a type of consensus without as much relational work is the Delphi method. In the Delphi method, experts answer surveys or questionnaires in two or more successive rounds. After each round, a facilitator synthesizes, summarizes, and presents the results before the experts answer the next round of questions, hopefully helping the experts to revise answers based on replies of other experts. The goal is that the range of answers converge

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through successive rounds and synthesis, reaching a consensus. Delphi avoids the relational work of in-person consensus as the experts are anonymous to each other and never meet or talk. In Delphi, the facilitator or survey requester initiates, usually only experts participate, and the facilitator holds the most power by using their interpretative and subjective lens during the synthesis and summary process. The facilitator also holds power in choosing who they believe to be experts, as non-experts do not participate.

A sociocracy is a type of equality-based self-governance that uses consent-based decision-making among people working toward a common goal or interest (Šavareikienė 2019). In sociocracies and in consent-based decision-making, in general, the group is only deciding on one option at a time – a yes/no vote. One person initiates a discussion on a proposed option in four stages. First, the option is presented. Then, people ask only clarifying questions. Third, people may suggest changes or amendments to improve the proposal. Lastly, people may object if the amended proposal violates previously agreed, high-threshold rejection criteria, such as harm, abuse, inequity, and so forth. The goal is to find something that everyone is at least willing to try, even if it may not work or be the best. Objections are set at a high level for important values that the decision should not violate. Similar to consensus, anyone may initiate, everyone participates. However, the person who initiates first has an advantage, as her proposal is deliberated first. As long as people are willing to try it, it is chosen even if there are other options they would be willing to try. Like consensus, a minority may object, but a minority cannot cause a decision to pass. However, the minority has less power in consent-based decision-making because objections require a higher threshold, and the minority must show how it violates a specific value or criterion.

The gathering and participatory approaches are two types of social settings for group decision-making. The gathering uses a problem-solving approach, trying to resolve as many individual needs and problems as possible. There is a bias towards action, as people can make multiple decisions and take action without agreement from some group members. Anyone can initiate and participate, while leadership lies mostly with the majority because agreement is not required from everyone. Depending on group size, you may have equitable co-leadership between the majority and minority.

In participatory processes, as defined here, each participant would have input into the decision directly proportional to the amount they are affected by the decision. Those who are more affected have more input; and those least affected have less input; those unaffected have no input; those fully affected have full input. Even though anyone can initiate, only the affected participate and lead. However, among the affected or fully affected who are deciding, the decision-making process is prone to the same political dynamics previously mentioned depending on the decision-making model chosen.

Regardless of the decision-making model chosen, all models are subject to pitfalls such as miscommunication, facilitator control, collusion, political gaming, avoidance tactics, analysis paralysis, motivational biases, and cognitive biases (Briskin & Erickson 2009; Dietrich 2010; Lu, Yuan, & McLeod 2012; Forsyth 2018). Though democratically aspirational groups view voting as "fair" or "democratic" because everyone participates, everyone does not decide. Those in the power minority may still be unhappy after decisions, feeling their vote did not matter or that the decision does not factor their concerns, though their vote was counted through participation

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(De Dreu & De Vries 1997; Alonso & Ruiz-Rufino 2007; Agarin 2013). Politically elected leaders try to assuage minority grievances by promising to govern for all, though not elected by all.

If RPD teams use decision-making models, they first decide how to decide. They focus on agreeing to a fair decision-making process whose decisions all agree to follow. Because this requires full agreement, they use unanimity, consent, or consensus to decide how to decide. However, all of these various decision-making models' difficulties stem from a deeply embedded individualism, fundamentally conceiving of group decision-making as a balancing act or selection between different individualist positions (Tan, Otto, & Wood 2017; Vermillion *et al.* 2017; Poznic *et al.* 2020; Rahman *et al.* 2020; Sharma, Allen, & Mistree 2021; Singh, Cascini, & McComb 2022). What might a decision-making process fully based in radical relationality look like? What ingredients lead to such a relational approach to decision-making?

4. Ecological ingredients of a relational approach to decision-making

There is already a type of RPD that extends relationality to the very design methodology used in RPD. The relationality can then be further extended to the decision-making processes used in RPD. Let us first examine this specific type of RPD.

Often, especially between the professional designers and the community members, RPD involves design in relationship-designing alongside people with whom you may have no prior relationship and with whom you may build relationships as you design. Often between community members, RPD involves design with relationship-designing alongside people with whom you already have a continuing relationship upon which you continue to build. Depending on the project, RPD may focus on design for relationship-design with the purpose or intended outcome of improved relationships between multiple people or groups.

One subset of RPD methodologies fall under the meta-methodological category of Relational Design (RD). In RD, we do not only design in, with, or for relationships; we use relationship-building methodologies as design itself (Udoewa & Gress 2023). In RD, the design-as-relationship-building model extends the deep relationality of RPD to the very methods the community uses, such that the methodology or process might be unrecognizable as "design" to a professional designer.

In RD, the deep relationality can also be extended to the decision-making in the design process. There are at least three ingredients for such a relational approach to decision-making: relationality, emergence, and autonomy.

4.1 Relationality

A relational approach to the political ecology of decision-making can imply different kinds of relationality contrasted with individualism. Let us explore four levels of relationality.

One level of relationality is oppositional dualism. Oppositional dualism takes a structuralist view of the world and describes two separate, individual opposites – mind/body, nature/culture, emotion/reason, man/woman, and so forth. Each of

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the two opposing entities is distinct and independent of each other. They may relate in various ways, like the mind telling the body what to do or the body influencing the mind to act out of passion.

Another level is complementary dualism, in which two entities reciprocally interact to bring about a type of homeostasis or balance. This can be seen in the Chinese philosophical concepts of yin and yang in Taoism and Confucianism and the Yanantin in indigenous Andean cosmology (Girardot 1988; Webb 2012). Instead of opposition, there is a harmony between the two bringing about an outcome – balance – that cannot be achieved by either one alone. Again, each of the two opposing entities is still distinct and independent of each other, existing before and outside of the dualistic relationship, though their sum is greater than their parts.

Systems and network theories point to another level – interconnectedness (García, Sullivan, & Tsiang 2017; Goodchild 2021). There are many, not just two, interconnected entities. They are independent and interdependent, influencing one another and creating system-level behavior and purpose. Every entity is connected and affects every other entity. Still, all entities in this web of interconnectedness exist independently before or outside of the system relationships in which they participate.

A fourth level is radical relationality, in which nothing exists outside of the relationships that constitute it (Escobar 2018). For example, a flower can be thought of as a separate entity that exists independently from its surroundings. Through a relational lens, we realize that the flower cannot exist apart from the soil that supports its substrate and roots, the water that strengthens its form and nutritional delivery, and the sunlight that fuels its survival and journey upward. In other words, without the soil, sunlight, and water and their interactions and relationships, the flower does not exist. The flower can truly be considered its relationships, an emergent property of those relationships. In relational, autonomous group decision-making, it is this level of relationality and emergence we seek.

4.2 Emergence

"Emergence is the way complex systems and patterns arise out of a multiplicity of relatively simple interactions" (quoted in Brown 2017, p. 17). We see emergence in the swarming behavior of various animals, large and small, such as schooling fish or murmurating starling birds. Murmurating starlings follow three rules.

1. Move in the same direction as your nearest six/seven neighbors.
2. Stay comfortably close to your nearest six/seven neighbors.
3. Avoid collisions at all costs.

In following those three basic rules, starlings create some of the most beautiful multi-dimensional shapes, flows, and movements, interpreted by humans to appear like shapeshifting, recognizable objects – a shoe, a tiger, a giraffe, a gavel, etc.

It is the set of rules, or emergent strategy principles, that are another ingredient in a relational approach to decision-making. Though a group of humans may choose any set of behavioral principles to follow, in my experience, RPD and RD groups use social justice facilitator Adrienne Maree Brown's six elements of emergent strategy (Brown 2017, 2021). She associates five of them with emblems or symbols.

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1. Ferns (dandelions, broccoli, etc.) – Fractal awareness: *Be the change you want to see.* Small-scale work impacts the whole system. Use similar principles to build change at all levels and scales. Any outer change we want to see in the world, we first embody at the small scale. The large is just a reflection of the small.
2. Starlings (schooling fish, water, etc.) – Intentional adaptation and collective leadership: *Always be responding to your environment and the movements of others in your group.* Without a single leader dictating or orchestrating choices, respond to your environment and those around you. A single member can transform the movement of the whole group.
3. Mycelium (ants, trees, etc.) – Interdependence and decentralization: *Rely on each other by delegating and distributing power and functions.* Like oak trees that bind their roots below ground or birch, ash, and mangrove trees that arise from one root below, practice collective sustainability. Like ants, we rely on each other in order to do our own work (cooperative work).
4. (Spirals, fiddleheads, compost, etc.) – Nonlinearity and iteration: *Always be learning.* Growth is always nonlinear and passes through learning pains. Everything, every (mis)step is part of the process. Find the lesson. Always ask how we learn from this.
5. Dandelions (starfish, mushrooms, etc.) – Resilience and transformative justice: *Create time to recover, restore, rebuild, and heal. Transformation will follow.* A caterpillar does not immediately become a butterfly but spends time in the cocoon in a process of metamorphosis. With resilient medicinal properties, dandelions transform in time from a flower head to a seed head, each seed using its parachute mechanism to spread far and wide, growing and establishing strong taproots in new locations that are hard to uproot. Move at the speed of trust. Focus on resilience, relationships, and critical connections over critical mass.
6. Wavicle – Create more possibilities. *Always create more possibilities, embracing diversity in the work and ways of being.* When faced with a binary choice, create a third, fourth, and fifth option. Embrace a diverse movement with diverse ways of doing, knowing, and being. The wavicle represents the dual nature of matter as both wave and particle. Uncertainty and mystery will always be with us. Value both natures of our work, the process and the outcome.

Following a minimal set of behavioral rules can lead to the emergence of design, or emergent design. Emergent design has been used to indicate design created when researchers or designers use a flexible approach, intentionally adapting to or responding to new or unanticipated learnings, concepts, and ideas (Cavallo 2000; Thompson & MacDonald 2005; Pailthorpe 2017; Hammersley 2022). I use emergent design to refer to a type of unplanned design that emerges when all individuals in a group consistently follow the same, minimal behavioral rules. The beautiful shapeshifting flows of swarming fish, starlings, and so forth are emergent design. In certain RPD and RD projects, the team practices the same emergent design principles above to allow designs to emerge in the work, as opposed to design being the result of a plan or structured process.

4.3 Autonomy

The third emergent strategy element, interdependence and decentralization, is related to the third ecological ingredient for relational decision-making – autonomy.

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From an individualist perspective, autonomy is the right or condition of self-governance, self-determination, and self-authorization (Mackenzie 2014). In workshops, when asked to map their group or organization on a spectrum between high relationality and high autonomy, leaders will attempt to mark the location characterizing their group. However, it is a false choice because relationality and autonomy can coexist within a group. A group can demonstrate low, medium, or high autonomy within itself while expressing any level of relationality (low, medium, or high), creating a simplistic 2D, 9-cell matrix.

The individualist understanding of autonomy fails to account for decision-making as an ongoing process, non-Western understandings of the self as interconnected and a part of community and nature, non-Western understandings of identity that are group-based, a bigger non-ableist vision of personal identity for those who may invite communal help, especially when incapacitated, collectivist decision-making, and decision-making in consideration of others that is affected by others and affects others (Gómez-Vírseda, De Maeseneer, & Gastmans 2019). We strongly define relational autonomy as collaborative self-determination that fundamentally emerges from constitutive relationships or fundamentally exists in relation to others, balancing interdependent entities in a community, or with overlapping projects (Donchin 2000). The third emergent strategy element hints at relational autonomy because it does not seek decentralization and independence (individualist autonomy), but interdependence.

When multiple autonomous organisms, living in close physical proximity, relationally co-evolve in mutually beneficial ways, a design can occur that would not have resulted from a planned design process. Indigenous scholar Yunkaporta calls this symbiotic design using the example of the bush, ant, and butterfly (Yunkaporta 2019). A particular butterfly plants its eggs in a particular bush above the nest of a specific ant species. The ants take the eggs down into their nest. When the larvae hatch, the ants carry the larvae up to eat the leaves, and later, when the larvae are too heavy, the ants carry the leaves down. The larvae develop jelly on their sides, which the queen ant eats. When the larvae spin a cocoon and transform into a butterfly, the cycle repeats. This is a symbiotic design.

Even though we consider the human an organism, 30% of the human body mass are other organisms. We humans are living ecosystems within ourselves. The bacteria in our gut receive a hospitable living environment and nourishment, and we receive metabolites, improved immunity to pathogenic organisms, and more. Without any individualist planning or decision-making processes, the bush, ant, and butterfly, as well as our bodies and gut bacteria, have evolved symbiotic designs from relational autonomy. In other words, over time, relational autonomy between organisms, people or groups leads to symbiotic designs. With the elements of relationality, emergence, and relational autonomy, we now explore the biocracy, a relational, autonomous approach to decision-making that can lead to emergent or symbiotic design.

5. Radical biocracy

The term biocracy is used in multiple ways: the exploitation of life by the political economy or workplace, the power and influence of life sciences on society and politics, and political models that include non-human nature as constituents with rights (Fleming 2012; MURAY 2017; Caldwell 2019, 1985). In 1933, Walter Cannon

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introduced the term biocracy as the most efficient and stable human society in which all the various cells are organized into functional tissue and organs producing a vibrant, dynamic, and cooperative democracy "in which any form of dictatorship leads to degeneration and death" (1933).

Using the emergent strategy element of fractal awareness, we apply biocracy at the mesoscale level to organizations and specifically teams – systems practice and design teams. Modeling the governance of a team after the human body, how does a biocracy change the process of leadership and decision-making on a design team? Let us look at the example of the body responding to a paper cut on the skin.

Various components of your body do not hold a decision meeting, give their opinion, or vote due to disagreement between different cells. No, instead, every organ, tissue, and cell has its relationally autonomous goal, which it is always fulfilling. Thus, the autonomy of the entire body emerges (Pomeroy & Herrmann 2023).

Blood platelets immediately join together, forming a clot to stop bleeding. They release cytokines, a chemical, to attract other cells to aid healing. Neutrophils and macrophages are white blood cells who constantly patrol for invaders beneath your skin. Neutrophils, the most common white blood cell, start eating invading germs, fire antimicrobial proteins, or set deadly extracellular traps while sending signals to attract other cells, like more neutrophils. Macrophages, like huge vacuum cleaners, go around and collect debris that should not be there, like damaged cells or germs. Usually unable to eat all the germs, it takes a part of the eaten germs, called antigens, and sends them to dendritic cells in lymph nodes.

The dendritic cells pass these ID tags, or antigens, to inactivated helper T-cells. When the germs have overwhelmed the macrophages and neutrophils, the helper T-cells take the antigen information and find an inactivated killer T-cell that is matched to the antigen. That killer T-cell makes many more copies of itself, and they follow the path of cytokines to the infection. The killer T-cells shoot cytotoxins at the germs and any infected skin cells while the macrophages vacuum or eat the remains.

With certain germs, the killer T-cells will activate B-cells to use antibodies to neutralize germs that have not yet infected cells. When the infection is gone, the T-cells and B-cells return to the lymph nodes as memory cells, retaining a memory of how to fight any germ with the same antigens.

This healing, defense process occurs without competing individualist concerns, voting, or debating. The example is one of countless examples of emergent design within our plant and animal biology. Because organizations are complex, adaptive, living systems similar to human bodies, public health researcher Boom applies characteristics of healthy human bodies to healthy, biocratic organizations, which I apply to teams (Bloom, 2023, 2019).

1. *Healthy teams have a vision and purpose* – Like the body, systems manifest a purpose. It is better to explicitly build a shared vision and purpose rather than let unconscious dynamics determine them.
2. *Healthy teams maintain homeostasis* – The body maintains homeostasis in order to survive. Teams must be able to restore balance when faced with disruptions and challenges that cause stress and destroy cohesion and purpose.
3. *A healthy start is helpful* – Like plants, ecosystems, and animals, teams who have healthy starts to their life experience are more likely to adapt and be resilient to challenges in maturity or adulthood.

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4. *Healthy teams have continual checkups* – There are sub-functions that are constantly checking on the body's health and responding immediately. Problems found earlier are easier to address for teams.
5. *Healthy teams create safety cultures* – One purpose of the human body is to preserve life and maintain safety. The body distributes safety work and reduces risk or harm through preparation, learning, and healing. Teams cannot have full participation without safety.
6. *Healthy teams distribute power through radical participation* – The body is a deeply relational, participatory system, with each cell doing its relationally autonomous part.
7. *Healthy teams are learning teams* – Like memory cells, the body learns; the brain is always rewiring. It is difficult to create a safety culture or make checkups useful without learning.
8. *Healthy teams have healthy digestion* – The body uses food for energy and cell repair while eliminating waste. Healthy teams continually let go of waste for proper growth.
9. *Healthy teams have healthy circulation* – Healthy teams, like the body, are full of constant communication and feedback loops in order to function, grow, and learn.
10. *Healthy teams have a healthy immune system* – Like the body, we cannot predict when harmful agents, processes, or forces will enter team communities. Healthy teams have processes, roles, and subsystems that automatically neutralize harmful forces.
11. *Healthy teams recover after injury* – Healing processes and work must be a function of a team or organization; otherwise, injuries will worsen and destroy it.
12. *Healthy teams have a collective autonomous brain* – This is the emergent design and symbiotic design that arises not from individual sentience but from collective leadership like the starlings in emergence theory.

Cannon and Boom envision biocracy as a means to democracy, or as a societal, organizational model that includes actual people in decision-making leadership roles. Instead, we envision a Radical Biocracy that uses a leaderless leadership model similar to the "involuntary" autonomous systems of the human body. In this model of Radical Biocracy, decision-making is an emergent or symbiotic process that emanates from three ecological ingredients – relationality, emergent strategy principles, and relational autonomy. Emergent design depends on all three, while symbiotic design only requires relationality and relational autonomy.

In a Radical Biocracy, when design team members practice relationality, follow a small set of principles in their work to promote emergence, and act autonomously, actual design decisions, design choices, and designs emerge without ever having to vote, deliberate, negotiate, or decide. This is the same phenomenon that occurs with swarming fish, or starlings. When each team member continually does and fulfills their role, making autonomous choices that relationally support the whole while following a set of principles, designs emerge without a leader or facilitator. This is the same phenomenon that occurs with involuntary functions in the body, with different cells focused on different functions, the body operating with a type of knowing outside the knowing of any individual cell, a type of fourth person knowing, a knowing at the level of emergence (Scharmer & Pomeroy 2024).

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Similarly, when design team members practice relationality and autonomy and work together over sufficiently long periods of time, each person making autonomous choices in relation to the other and adapting, then design choices, design decisions, and designs can evolve and emerge from the close, symbiotic relationship of the members. These designs work in a way such that there is mutual benefit to the different design team members or design team members' work. This type of symbiotic design is the same implicit, evolved design that occurs within the human body between the human digestive system and the microbiome in the human gut, for example.

Moving to a Radical Biocracy decision-making model is quite challenging when done in isolation. It is very difficult to try to practice such relationality and leaderless leadership in decision-making alone. It is easier when such deep relationality is already foundational and embedded in a team's way of being and knowing such that it naturally extends to decision-making as well. As a result, the only examples or case studies I have experienced of Radical Biocracies are RPD projects that specifically practice Relational Design (RD). To further clarify what a Radical Biocracy looks like, I will share those case studies in the next paper in the series.

6. Conclusion

This is the fourth paper in a series of papers describing RPD and RD. This fourth paper focuses on the decision-making dynamics often found in an RPD-RD process.

We traversed snapshots of decolonized histories of group decision-making. Consensus did not emerge in the 1960s, and democracy was not born in Ancient Greece. Collective decision-making, whether through consensus or even voting, has always been in existence as long as there have been groups of social animals, including early humans, who worked and shared life together for shared goals and survival and communicated in some form. Language is not a requirement.

Then, using an RPD analysis of participation, we analyzed multiple group decision-making models, noting their basis in individualism, which fails to address all competing desires. Instead, we explored three ingredients for a relational approach to decision-making – relationality, emergence, and relational autonomy. All three can lead to emergent design, while relationality and relational autonomy can lead to symbiotic design. Emergent design and symbiotic design are examples of design that can emerge over time without explicitly deliberating group decisions.

Radical biocracy uses human biology as inspiration for team or organizational governance and decision-making. This results in a leaderless leadership model in which there is leadership but not from an individual making final decisions. Instead, collective leadership is an emergent quality when groups allow the design to emerge from relationality, emergent strategy principles, and relational autonomy.

A radical biocracy allows relationality into transform decision-making to an emergent phenomenon. It can be challenging to try to move from a hierarchical decision-making process to a Radical Biocracy if all other parts of a group or organizations are not infused in radical relationality. Radical Biocracy works better as an extension of deep relationality that is already present throughout a group or organization's beings and doings.

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In this next and fifth paper, I will share two examples of Radical Biocracy in action, one that shows emergent design using all three ingredients, and a second that demonstrates symbiotic design using relationality and relational autonomy. More work is needed to see it extended to larger scales and groups.

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