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Constraint breeds creativity: A brainstorming method to jumpstart out-of-the-box thinking for sustainability science

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Abstract

Conservation science often addresses highly complex issues; creative approaches can help develop new ways of doing so. We describe “constraint-based brainstorming,” a 10-minute creativity-inducing exercise inspired by design thinking. Though we applied the method with the goal of developing creative environmental valuation methods, it is applicable to almost any complex, interdisciplinary environmental research problem. We tried the approach at two academic workshops, in Japan and Germany. We generated, in each short activity, scores of unique ideas for the target question. We present this engaging activity as a way to simultaneously achieve multiple outcomes that can support innovative conservation science: quickly generate many “seeds” of ideas to address a challenge or goal; offer insight into nuances of and shared convictions related to the topic at hand; set a tone of creativity and breaking outside of established thought structures; and build community around a willingness to take risks and freely share ideas.

Keywords

creativity; design thinking; inclusivity; wicked problems; workshop

Introduction

Multiple international bodies agree that transformative change is required to reach sustainable futures (IPBES 2019, UNDP 2020, CBD 2022, IPCC 2022). To achieve transformative change, almost by definition, we must expand our collective thinking beyond its current boundaries (Fazey and Leicester 2022). Transformative change discussions (for example, how to dramatically reduce consumption of material goods) often center around societal institutions and practices. Yet a less-discussed element of transformation toward sustainability involves re-thinking how we generate ideas, both for conservation science and for achieving sustainable futures. In this paper, we suggest a method that contributes toward transforming ideas generated in academia to enable more creativity and risk-taking: a rapid brainstorming method.

In this Special Report, we describe a rapid brainstorming activity that we call “constraint-based brainstorming”. It is a version of a practice common in design thinking (as described, for example, in Ulibarri et al. (2019: 121)). We applied constraint-based brainstorming in the context of environmental valuation – a field that aims to help understand nature’s importance. We argue that innovation in how we talk about and express why nature matters is needed to develop and implement sustainable practices at the collective level. It was in this spirit that we conducted this exercise: to help us expand our thinking and open new possibilities.

A description of “constraint-based brainstorming”

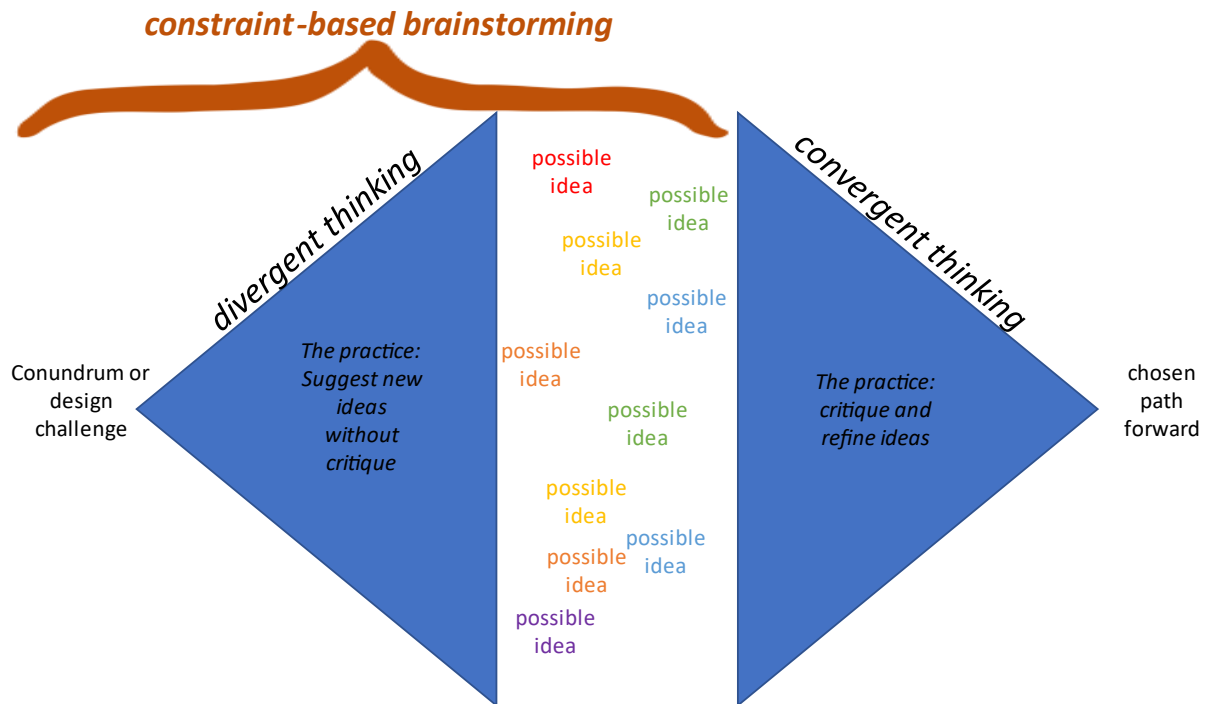
Constraint-based brainstorming definition. Constraint-based brainstorming is a flexible facilitation technique that encourages quick generation of a large number of ideas. It centers on the iterative application of (often fun, light-hearted) limitations on brainstormed ideas. Below, we introduce the method’s intellectual background and describe the two contexts in which we tried it. We then provide a guide for how to implement constraint-based brainstorming.

Intellectual background. This method was inspired by design thinking, which has been called a “methodology for creative problem solving” (Stanford d.school 2020). Design thinking was originally developed for and applied to product development, but has since been applied to many other arenas – including research realms (Dunne and Raby 2001, Malpass 2016). This paper reports on a permutation of a technique that Ulibarri et al. (2019) discuss; the technique finds basis in the idea that, somewhat counter-intuitively, constraint often breeds creativity. Though it may seem that constraints would stifle expansive thinking, in fact, it is often the ‘blank slate’ of nearly limitless possibilities that can lead to idea paralysis. If almost anything is possible, our brains think, where in the world should I start? When a constraint is imposed, however, we can start to fill that drastically reduced space with specific ideas.

The approach we describe focuses on only one aspect of the design thinking approach; it omits iteration between convergent and divergent thinking (Ulibarri et al. 2019) (Figure 1). In design-thinking approaches, these both play a necessary role. Convergent thinking aims to “shave away” less useful ideas to *converge* toward a desired path forward. It is methodical and discerning. Divergent thinking is in many ways the opposite: it aims to generate an avalanche of ideas that *diverge* from expected or tried-and-true paths forward. It is exuberantly chaotic and staunchly

indiscriminate. Convergent thinking is arguably more common in academia; divergent thinking can, in academia, be rare.

Figure 1. Conceptual depiction of divergent and convergent thinking processes. The figure demonstrates the different roles of divergent and convergent thinking in idea generation and refinement.



Yet divergent thinking can be powerful. It aligns conceptually, for instance, with the role of “radical imagination” in radical transformation. Radical imagination liberates peoples’ imaginations toward dramatically alternative possibilities; it thus offers one way to break with seeming “givens.” This can open possibilities to rethink the very frame in which we even imagine possible futures. It is a collective process, often associated with art or activism, of understanding and sharing possibilities for both current and future conditions (Haiven and Khasnabish 2014). The idea of radical imagination facilitates empathy and collaboration to

realize social transformations; it offers possibilities for those with different views to understand one another (Reinsborough 2011). Radical imagination has been identified as relevant to diverse issues, including the climate crisis, colonialism, and racism (Alfred 2011, Haiven and Khasnabish 2014, Kelley 2022).

Our two implementation efforts. We piloted constraint-based brainstorming as a short exercise at two academic workshops focused on relational values. Relational values, which signify the importance of meaningful relationships arising from interactions between people and nature, have become an increasingly recognized, yet relatively underdeveloped, concept in understanding the importance of nature and its contributions to people (Raymond et al., in press). Both workshops aimed to further develop the relational values concept, if in different ways.

One workshop, organized by author H. Ishihara, was at Kyoto University (Kyoto, Japan) in October 2022. The other workshop, organized by authors A. Himes and B. Muraca, was at iDiv, the German Centre for Integrative Biodiversity Research (Leipzig, Germany) in July 2022. Both workshops addressed the burgeoning field of relational values research; the one in Japan focused on working toward shared understanding of basic definitional elements of relational values, and the one in Germany focused on synthesizing research on relational values and Indigenous and Local Knowledge to suggest a framework for operationalizing relational values toward sustainable futures. At both workshops, the constraint-based brainstorming process took roughly 10 minutes.

The teams for both workshops, and thus our author team, bring a wide diversity of disciplinary perspectives (many of us have multiple disciplinary backgrounds). Seven of us identify as interdisciplinary environmental social scientists (RG, MC, TS, JP, NT, HI, KA) and three as environmental management scientists (MC, JP, KF). Four of us consider ourselves ecological economists (SO, HI, KA, JK). The team includes three ecologists (RG, AB, AH), two cultural geographers (TH, MT), two environmental philosophers (BM, LD), and two agroecologists (SO, KA). We also have two scholars of food systems and fisheries (NT, HI) and two of forestry (AH, NT).

Method details. Here we present a step-by-step description of constraint-based brainstorming. Materials needed are (a) sticky notes (five for each person), (b) a writing implement for each person (thicker pens or markers make it easier to share the ideas post-activity), and (c) a timer for the facilitator.

1. Describe “The challenge” to the group – identify the problem the brainstorming seeks to inform. In our case, this was to develop novel ways to measure or characterize relational values.
2. Break the group in two. Half form an inner circle and half an outer circle. The circles face each other, and people pair up.
3. The facilitator explains the ethos of the exercise:
 - a. You will receive a prompt and will have a short time (45 seconds) to think of an idea and draw or write it out. Therefore, your suggestion will obviously be far from fully formed. This should reduce stress and let you quickly suggest ideas.

- b. The prompts are mostly unrealistic, as well as quite constraining and specific.
- Both of these characteristics are intentional. Have fun with this and see what comes to you.
- 4. Explain the mechanics:
 - a. You will get one prompt and have 45 seconds to generate a response and draw or write it on a sticky note.
 - b. You will share your idea with the person you're facing for ~20 seconds each.
 - c. The inner circle will move by one person so you have a new partner. Introduce yourself.
 - d. [Repeat steps a-c for as many rounds as you want (around five was effective at our two workshops).]
- 5. Implement the exercise following the instructions in #4. See Figure 2 for the prompts we used.
- 6. Share all ideas generated with the entire group in whatever way(s) time permits. Ideas range from posting sticky notes in the group's workspace (what we did in both of our workshops) to making time to formally discuss ideas.

Figure 2. (a) Brainstorming prompts used in our exercise. “The idea” would be a central theme or challenge being addressed by the workshop or effort; in our case, it was ideas for methods to characterize relational values, but the method could be used for an expansive array of sustainability challenges. That the prompts are unrelated to environmental issues is intentional; this helps to expand thinking beyond “typical” responses in the environmental realm. (b) Suggested considerations for those who wish to develop their own prompts. We have no evidence of how these various approaches will impact idea generation; future research could explore this. The ideas related to “opposed” prompts and “extreme” prompts came from an anonymous reviewer.

Creative brainstorming prompts used in our exercise:

- The idea must involve magic
- The idea is one a six-year-old would create/understand
- The idea is being implemented 200 years ago
- The idea cannot involve speaking
- The idea must make people laugh

Suggested considerations for prompt selection/creation (future research could explore the impacts of these different approaches):

- Use, or modify, pre-existing prompts like those above.
- Consider the nature of the challenges being addressed, then either choose prompts that align with or directly oppose desired characteristics (ideas from the latter would then be 'inverted'). E.g., if more inclusivity is desired, an aligned prompt might de-academify ideas or encourage collaboration between disparate actors; an opposed prompt might be highly exclusive.
- Choose prompts that are absurd or impossible, as this gives people permission to propose ideas they would otherwise self-censor.
- Design extreme prompts (e.g., must cost a billion dollars or must require no money at all).
- Design prompts that limit (or eliminate) conventional, accepted responses to the problem that people are likely to fall back upon.
- Choose prompts associated with fun or enjoyment (e.g., children, art, magic) to

It seems obvious that the specific prompts will dramatically impact the ideas generated.

Interestingly, although multiple design-thinking sources recommend this constraint-based brainstorming approach, there is little discussion (of which we are aware) of how to choose prompts for particular exercises. Ulibarri et al (2019) briefly describe this exercise, and mention that “some constraints work better than others on a given problem” (p. 121) – but they do not elaborate on considerations for choosing effective constraint prompts for given problems.

For our workshops, the lead author created five prompts that she thought would represent a variety of approaches to the problem of characterizing relational values; many were inspired by

prompts suggested by design thinking scholars and practitioners. We hypothesize that the particular array of constraints is less important than the ethos of the exercise, but we offer a set of considerations for prompt development in Figure 2. We emphasize that the two main characteristics of the prompts—constraining yet fanciful/unrealistic—are both important. The constraining characteristics is restrictive: it delineates what is possible. The unrealistic characteristic is expansive: it opens unpredictable paths for imagination. This combination of restrictiveness and openness/expansiveness is uniquely tuned to trigger imaginative and creative ideas; this duality wrings out creativity from participants' minds.

As noted above, to our knowledge prompts have not been systematically tested, nor was this the goal of our exercise. Future work could explore the influence of particular constraints. For example, researchers could tweak and refine constraints in systematic and transparent ways, then report on outcomes.

What came of our use of constraint-based brainstorming?

Across our two workshops, with approximately ten participants in each, we generated over 100 different ideas to address our focal challenge: how to represent and characterize relational values linked to the environment. Many of the ideas were zany and unrealistic; some were more immediately feasible. However, even the fantastical ideas offered thought-provoking nuggets of insight about promising ways to address our focal challenge. As one example, one idea generated from the “must use magic” prompt was to make an entire landscape disappear and see how people feel about it. Though this exact technique is obviously not possible, approximations of it

are. Scholars of environmental values suggest that one powerful way to understand the value of landscapes that may be taken for granted or simply not reflected upon is to ask people what it would be like to lose that landscape (Gould et al. 2020). The “make a landscape disappear” idea suggests a more vigorous version of this approach – for instance, to create a more involved thought experiment, virtual reality experience, or piece of art that offers a realistic experience of a landscape’s disappearance, then assess participants’ reactions.

Table 1 presents a sample of ideas generated in each workshop (it represents about half of the total ideas generated). A number of themes core to the challenge at hand are evident when the ideas are considered collectively; we found this realization helpful to articulate concerns or approaches that are core to the group. We discuss some of the more notable themes in the “Outcomes of this process” section.

Table 1. A sample of ideas generated in response to each prompt. Brackets after some entries indicate that these entries address empathy [EMP] or honesty [HON], both of which are discussed in the text. [next page]

Sample of ideas generated in Germany (dark grey) and Japan (light grey)										
Prompt										
Must involve magic	Re-tell or collect existing stories that involve magic (e.g., traditional tales that represent relational values)	Actually create environmental scenarios and live them out	Use Alohomora (Harry Potter magic door-opening spell) to open doors to encounters and relations across different worlds and world-making practices.	Freaky Friday mind swap (be able to exist in someone else's mind) [EMP]	Make a landscape disappear and ask people how they feel about it.	Administer (with consent!) a 'magic potion' that allows participants to honestly and comprehensively communicate RV (would reduce social desirability bias, make people comfortable) [HON]	Experience (feel, perceive, understand) the world from within others' minds. [EMP]	People can talk with trees and express their RV directly	Read someone's thoughts [EMP]	亡くなった父と出会える (meet your father who has passed away)
Created by six year-old	Draw values on the wall	Use blocks to build a desired world and explain why it's desired	Give people Play-Doh and ask them to make sculptures that represent their relational values	Hug each other because RV are important for identity, wellbeing, and love	Make parakeets to represent layers of values.	People answer truthfully (not strategically) [HON]	Use toys to express relations with animals	create a toy or art from what can be found outside	Have a food tasting that allows people to "taste" RV	Draw monsters that represent threats to RV and what is scary
Implemented 200 years ago	Kabuki theater (Japanese performance art)	Use maps and represent RV with natural materials (e.g. leaves)	Consider how RV could play a role in anti-colonial fights	Celtic circle dances from the Alps where I grew up.	Make a drawing using stones and sculptures	Analyze Camphire stories	Experience and/or analyze religious ceremonies	Symbolic animals as representations of RV	Chat with friends about RV	Observe what people eat, why, and where it is from on the landscape
Cannot involve speaking	Chinese calligraphy - multiple symbols to represent same content (ontological pluralism)	Represent your RV with dance moves	Silent Dialogue: Hang up statements or pictures. People comment (including on others' comments)	Use horns and whistles to pass RV-related messages	Represent RV using colors	Dance	Cook something taken from nature	Mimic one another's actions	People have to demonstrate/pantomime their RV	Measure the size of RV by bodies
Makes people laugh	Use a selfie app with distortion effects to help people rethink their own perspective [EMP]	Throwing eggs or using a water gun toward the scale instead of checking a box to answer	Ask people to tell jokes that represent their RV, stand-up comedy style	Use downs to convey RV	Imitate the non-human animal that has most relational value to you	Tell a joke about RV!	Mimic an animal (both sounds and body movements)	Haragei (Draw someone's face on belly and dance)	急に顔を出す (Abrupt turn my face, or a facial performance)	Let's jump into the sea!

The “convergent thinking” stage. Constraint-based brainstorming encourages divergent thinking – the generation of many ideas that are expansive and creative. A full and formal design-thinking process would follow this idea-generation stage with a “convergent thinking stage.” In convergent thinking, the team applies more discernment: it selects potentially promising, incompletely contemplated ideas from the divergent thinking stage and considers how they might be modified to become realistic. This progression enables a team to quickly and energetically think more broadly and generate pilot-able ideas that would not have emerged by ‘standing on the shoulders of giants’ alone.

Our team did not engage in a formal convergent-thinking stage. This was largely because neither workshop specifically focused on methods to characterize relational values, so spending more time on refining methods ideas would have deviated from the workshops’ goals. That said, wisps of the ideas generated entered conversations in multiple ways and thus informed our related activities. In the Leipzig workshop, for example, we conducted the constraint-based brainstorming activity in the middle of a week-long engagement, and in the days that followed we referred to multiple of the brainstorming ideas to inform discussions about methods. Thus even though we never engaged in a formal convergent thinking session to refine the brainstorming ideas, they infused our subsequent methods-related conversations. This could be seen as an informal convergent thinking process: we subsequently discussed ideas with some real-world promise, and built upon, were inspired by, or modified those ideas to inform suggestions of actual methods.

Outcomes of this process. For us, constraint-based brainstorming had multiple beneficial outcomes. We arrived at this list of outcomes via two main processes: informal, brief reflection during the workshops, and more extensive reflection and communication post-workshop, as we prepared this manuscript (e.g., as we responded to one another’s questions and built from one another’s reflections).

Here we name and briefly describe the most notable outcomes we identified.

First, the process helped us to quickly generate many “seeds” of ideas to address our challenge or goal. Even though more work would have been required to morph many of the ideas into practicable approaches to address our issue, we still find it encouraging and impressive that we generated scores of ideas, in minutes.

Second, the process helped us to embrace the complexity of the topic at hand, because it allowed us to think in new ways to think about underlying issues and tensions. This relates to the idea of wicked problems—problems that can be defined in multiple ways, lack clear causes and effects, and have no definitive ideal solution or endpoint (Rittel and Webber 1973). Scholars suggest that effectively confronting wicked problems will require creativity (Palmer et al. 2009, Chapman 2015)—we have to break, at least partly, from the systems that create the problems. Constraint-based brainstorming offers a kind of risk-conducive laboratory to create new ideas for research design that will be relevant in our increasingly complex, unpredictable, wicked environmental contexts.

Third, the process set a tone of creativity and breaking from rigid thought structures. Academic workshops (and academia more generally) can be strict, formal, and strongly beholden to established wisdom and approaches — characteristics that can stifle expansive thinking. Scholars have recognized the importance of disrupting existing thought conventions, especially in fields that identify the need for transformative change. Philosopher Donata Schoeller, for example, describes “Thinking at the Edge,” a method that aims to break from dominant academic conventions of disembodied cognition to incorporate felt experience into thinking. Core dimensions of Thinking at the Edge resonate strongly with Constraint-Based-Brainstorming, even though the methods’ exact goals differ. One goal of Thinking at the Edge, for instance, also describes a core goal of constraint-based brainstorming: to avoid “cutting off what does not easily fit habituated ways of framing something within one’s expert language and the scientific conceptualizations at hand” (Schoeller 2023). This precisely describes a primary purpose of constraint-based brainstorming.

This breaking from established thought structures is also relevant to interdisciplinarity. Disciplines often have different formalized cultures of expression, which can hinder communication in interdisciplinary contexts (Strober 2010). Constraint-based brainstorming encouraged—and in many cases, essentially required—people to think in new ways, even ways very different from dominant conventions in the field or in their disciplinary training. The constraints made it very difficult to have discipline-centric responses; people often had to simplify ideas to meet the restrictions. People’s simplified, constraint-bound responses often revealed core elements of their disciplinary perspective, stripped of jargon. This in some cases made it easier for others to understand that perspective and even identify shared foundations

between disciplinary perspectives. As one example, an ecologist in the group noted that the multiple variations on “mind-reading” (see below, under our fifth observed outcome) helped him to internalize the crucial role, in other disciplines, of understanding the thoughts and feelings and people very different from oneself; upon reflection, he drew parallels to his disciplinary proclivity to understand complex inner workings of plant communities. Constraint-based brainstorming thus facilitated contributions by, and mutual understanding among, participant from different disciplines—two keys to successful interdisciplinary work (Kelly et al. 2019).

Fourth, the activity built community around a willingness to take intellectual risks in a fun, mutually supportive way. It allowed people to “let loose” and not worry about the correctness of what they were offering. At perhaps a more basic level, most of us agreed that the activity was, quite simply, fun. It was lighthearted, fast-paced, and often funny and entertaining. Since enjoyment is related to creativity (Benedek et al. 2020), this simple positive attribute likely had unmeasured impacts on our contributions for the rest of the workshops. This characteristic may also have had different dimensions and implications in the different contexts of the workshops. In Leipzig, we had already been together for two full days and worked together in small groups to discuss many topics. Through these two days, we had established rapport; the constraint-based brainstorming exercise helped us to deepen those relationships. In Japan, in contrast, we had only been together for a morning session prior to the brainstorming exercise; workshop participants had given presentations about relational values. In this case, the constraint-based brainstorming exercise allowed us to get to know each other in a more informal, yet still workshop-relevant, context; it also added an element of free thinking to a group working to find common ground and connect various disciplines to the work of relational values.

Fifth, and unexpectedly, the activity highlighted aspects of the focal issue that were most important to many in the group. It seems that the process of suggesting methods with hardly any reflection helped to surface elements of relational values research that group members found to be central. It helped crystalize thinking by forcing communication through specific examples. That is, many of us approached each rapid-fire question by asking ourselves, often subconsciously, “what do I hope a method to characterize relational values can do?” We then suggested (often ridiculous) ways to achieve that core aim.

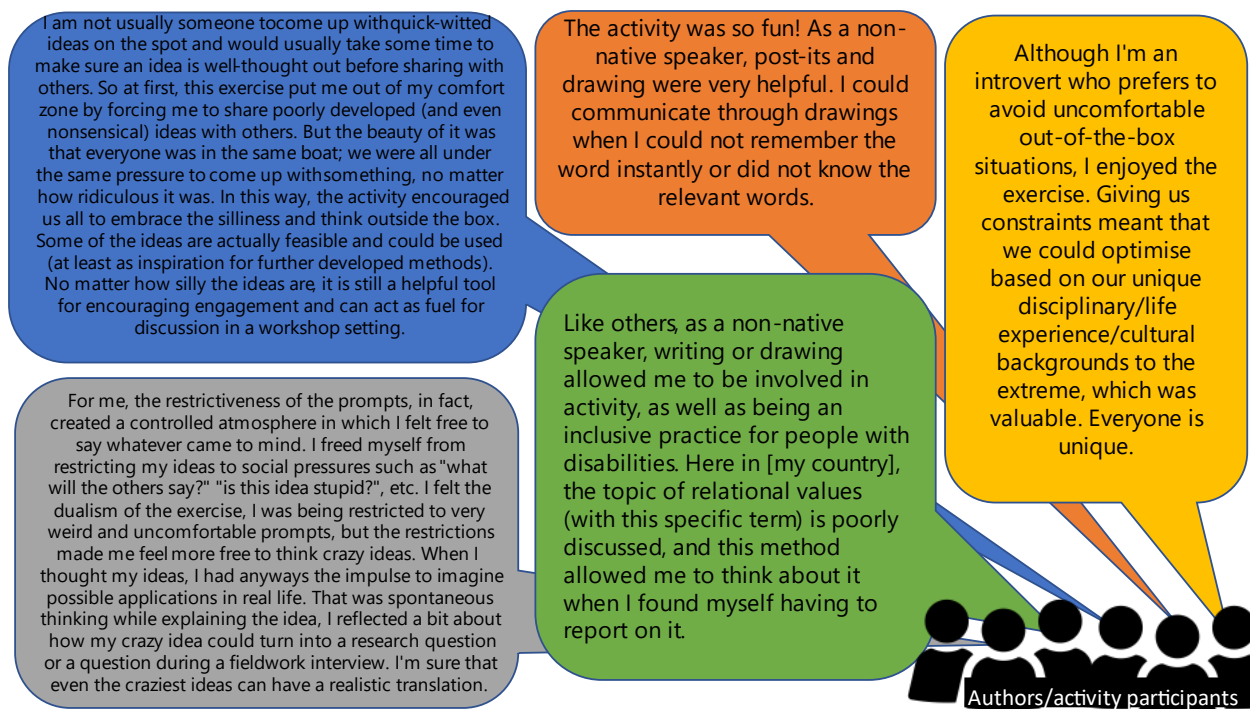
Two examples of emerging core issues are the importance of perspective-taking or empathy, and of honesty (to demonstrate breadth in Table 1, we have not shared all examples related to these themes). A striking number of the suggested methods, in many of the prompt categories, involved some version of “mind-reading” – i.e., of understanding others’ worldviews and points of view. Concepts such as magically switching minds with someone or otherwise having a chance to fully understand other points of view emerged multiple times. This goal resonates strongly with the idea of plurality and a “pluriverse” of ways of understanding the world (Escobar 2018, Himes and Muraca 2018), and also with procedural goals of deliberative democratic and participatory action research processes (Chambers 1997). Given these concepts’ centrality to relational values research, the repeated emergence of this theme is not, in retrospect, surprising. Yet that feature has not been prominent, or explicit, in discussions of relational values. The exercise helped to surface the idea and describe it without jargon. This clarified its importance for people with varied degrees of intellectual closeness to the topic (e.g., as

mentioned above, an ecologist with less intellectual proximity to conversations about the Pluriverse).

As another example, multiple ideas focused on acquiring “true” representations of relational values. This raised interesting epistemological questions that relational values research has not yet fully explored. Multiple people suggested methods that would eliminate strategic responses or responses influenced by social desirability. These ideas address common concerns in more positivistic social science research—for instance, concerns around social desirability bias – i.e., the tendency for research participants to respond in ways they think are socially desirable (Fisher 1993, Krumpal 2013). Yet when considered in an interdisciplinary light, these ideas raise important, complex questions about what strategic answering might look like and why people would not answer truthfully. These more complex questions include those about whether the values being analyzed exist in some “true” space (i.e., that peoples’ values exist in some fully formed way before researchers ask about them) or are constructed in the process of discussing them (Fabian et al. 1971, Kenter et al. 2019). The exercise thus helped to reveal assumptions so fundamental that they might not otherwise have been voiced.

In addition to these synthetic outcomes, we provide a sample of authors’ personal reflections on the process in Figure 3.

Figure 3. A selection of authors’ personal reflections, or “testimonials,” about the experience of participating in a short constraint-based brainstorming exercise. These reflections demonstrate that people experienced the exercise differently and noted different benefits.



Lessons learned for future efforts. We ended this exercise after the divergent thinking stage; we did not engage in a formal convergent-thinking process (i.e., we did not specifically consider the ideas generated and converge on ideas (or elements of them) that were worth pursuing). The exercise as we implemented it yielded many benefits, but we anticipate that adding a formal convergent-thinking phase would lead to different benefits – for instance, it would likely allow the process to develop specific feasible ideas. Goals and time availability could influence the choice of whether to add this phase.

We also noted that the activity works well in the middle of a workshop, when energy may be lagging and a “wake-up” activity that is positively disruptive – both physically and conceptually – is helpful. “Middle” can take many forms; in Leipzig, we implemented the activity halfway

through a week-long workshop, whereas in Japan we implemented it halfway through a day-long workshop.

As we discuss above, another interesting addition to the activity would be to generate prompts collaboratively. Generating prompts with the entire group would likely be time-consuming and confusing (because the activity is difficult to understand before participating), but a small team (e.g., of two to four people with diverse backgrounds, and who are familiar with the activity's general parameters) could quickly generate a diverse set of prompts (see Figure 2 for further guidance).

Constraint-based brainstorming can contribute to developing innovation and novel approaches; however, it does not guide participants to reflexively consider or deliberate on the biases of their worldviews, epistemologies, or disciplines. As they attempt to foster willingness to take intellectual risks, researchers need to be aware of their own biases. To this end, potential additions to the practice would be to add time to discuss the reasons behind people's choices, and to implement techniques designed to induce self-reflection (e.g., techniques developed in critical pedagogy (Fernández-Balboa 1998) and for academic reflexivity (Boyce et al. 2021)).

How this paper expands upon previous work. This work was inspired by a generic design thinking activity (see Ulibarri et al. 2019) and applied to environmental values. This paper elaborates potential uses of the technique in at least five ways:

1. We offer specific instructions of how and in what contexts one might do the activity (e.g., in an academic workshop; in an energizing physically active format).

2. We provide detailed examples of ideas that the technique can generate, which offer potential practitioners a sense of possible outcomes of the exercise (Table 1).
3. We offer evidence of how the process felt to participants (throughout the paper, including Figure 3).
4. We identify additional insights generated by the exercise beyond the results in Table 1.
5. By reporting our experience as a Special Report in a science-focused journal, we hope to promote constraint-based brainstorming, and design thinking approaches more generally, to a broad audience.

We invite and encourage further experimentation, learning, and report-backs on development of this and similar approaches into the future.

Conclusion: Relevance of this method to many fields and sub-fields

We conducted this exercise in relation to environmental values. We found this field to be a good candidate for the process because it:

- Is interdisciplinary and in some cases transdisciplinary.
- Attends to diversity and makes space for a broader array of ways of knowing than the currently dominant Western canon.
- Addresses a problem in which innovation and novel approaches can help lead to advances.

We share the technique because these characteristics describe hundreds of other sub-fields or activities within conservation science and beyond. Conservation-science examples could include

generation of ideas for scenario planning or creative problem-solving around natural resources management. Even farther afield, examples might include sub-fields of the health sciences, such as preventative healthcare or community health.

Importantly, though we used the activity in a purely academic setting, we anticipate that it would be effective as a transdisciplinary participatory approach to stakeholder engagement and decision-making. This is because the method can allow everyone, regardless of their background, to contribute to thinking about an issue. It helps to build a common, horizontal ground for all participants, independent of academic training, experience level, and knowledge system. All ideas are welcome; the method makes irrelevant epistemological hierarchies that would filter “scientific” from “unscientific” ideas. It thus helps to overcome (at least for a moment) academic arrogance and hierarchy, and it could expand easily to include non-academic actors.

To work toward the societal transformation needed to address our global crises, we need new ideas, and arguably ideas that may at first seem crazy—too far outside the norm. Such crazy ideas need a safe space to be expressed and discussed, rather than judged or ignored. Constraint-based brainstorming offers one small, contained example of a practice that can help to create such a safe, inclusive, fun, and even generative space. In so doing, it can contribute, again in an extremely modest way, to the transdisciplinary, anti-colonial, pluralistic, and democratic approaches that are strongly recommended for transformations toward sustainability.

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