The Wrong Theory Protocol: A Pre-Ideation Technique to Enhance Creativity and Empathy

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Abstract

The purpose of this paper is to introduce a new design methodology—The Wrong Theory Protocol (WTP)—to generate more empathetic and creative ideas. Our first ideas are seldom our best ideas. Many turn to brainstorming/ideation techniques, yet struggle to come up with ideas that help them make progress. Fixation can make it challenging to have insight that is genuinely new. Inspired by the idea that the darkest night comes before the dawn, the wrong theory protocol engages participants in first coming up with terrible ideas, before coming up with beneficial ideas. This paper describes the WTP, including a facilitation guide, and shares results of its use with diverse audiences of new designers. By testing WTP with various sociotechnical problems and audiences, we have identified ways WTP works to enhance the creativity and empathy of design ideas, provided the designer takes up the role of change agent. We share ways faculty who teach design can feasibly incorporate WTP into their courses.

Introduction and purpose

The purpose of this paper is to introduce a design thinking technique—The Wrong Theory Protocol (WTP)—to generate more empathetic and creative ideas. Our first ideas are seldom our best ideas. Many turn to brainstorming/ideation techniques, yet struggle to come up with ideas that help them make progress. This is because fixation can make it challenging to have insight that is new [1]. Inspired by the idea that the darkest night comes before the dawn, the WTP engages participants in first coming up with terrible ideas, before coming up with beneficial ideas.

In this paper, we first review a few existing ideation techniques and research on their usefulness and effectiveness. We then describe the WTP itself, how we developed it, and we share insights gained from use of WTP, including how we have adapted WTP, informed by working with groups that feel responsible for poor designs.

Background

Many efforts to generate creative design ideas fail to produce ideas that are actually creative. Here, following other scholars [2], we define creative as ideas that are *contextually novel* and *potentially useful*. This means that we would treat an idea that exists elsewhere in the world, but that is not locally known, as creative. Likewise, because we are focused on ideas—not solutions—we must also make our definition of *potentially useful* clear. Rather than only considering the feasibility of a solution, the usefulness of an idea may be in its potential to lead to or inspire other ideas. This aligns with both process models of creativity [3] and many techniques for generating ideas, several of which we describe below.

Early idea generation techniques like classical brainstorming tended to rely on the idea that if a designer produced many ideas, the probability should be greater that a creative idea will be produced [4]. Specifically, Osborne developed a suite of techniques—including withholding judgement, producing as many ideas as possible, recombing ideas in new ways, and coming up

with wild ideas, generally in large groups [4]. While many ideation techniques include some of these, others, like group size has been challenged, [5], and experimental research has consistently found that more structured techniques produce more ideas and more creative ideas [6-10]. For instance, techniques like SCAMPER (substitute, combine, adapt, modify/magnify/minimize, put to other uses, eliminate, and reverse/rearrange)[11], in which the designer poses questions like "What can I substitute?" or "What can I combine?" resulted in more creative ideas compared to classical brainstorming [12]. *Design heuristics* can be characterized as an expansion of the SCAMPER technique, though design heuristics is grounded in analysis of how expert designers go about their work [13, 14]. The 77 design heuristics strategy cards include specific suggestions, such as repeating an element, adjusting a function for a specific type of user, scaling up or down, contextualizing or incorporating the environment, and so forth. These well-studied techniques can help new designers develop creative and elaborated ideas [15].

There are also several design-by-analogy methods that are well studied and commonly used. For instance, designers using the TRIZ method [16] explore how others have solved similar problems, resulting in more varied ideas compared to classical brainstorming [17]. Design-by-analogy techniques like Synectics [18], biomimicry, and mapping networks of related concepts can help designers consider near or far examples, thus providing inspiration for new ideas [19]. Some research suggests that these techniques work best when designers consider far analogies [20] because doing so expands the problem space [21].

These ideation techniques are valued because designers sometimes commit to ideas too soon or become fixated. While this is common among novice designers, it also occurs when a design process is rushed [22, 23]. Past experiences with existing—even flawed—design solutions or ideas can structure designers' expectations and shape their ideas [1]. Thus, even when many ideas are generated, they may still not be creative. Additionally, felt time pressure, paired with a performance/delivery orientation can hinder creativity [24], so pressure to deliver on a deadline and pressure to have "best" or even "good" ideas can actually result in worse ideas. This is why so many techniques emphasize delaying judgement [25]. However, this can be challenging to actually do.

Coming up with bad ideas appears to be easier than coming up with good ideas [26]. Building on this idea, scholars proposed an ideation technique that involved generating bad, silly, or impossible ideas, then spending time identifying aspects of their ideas that are actually good or flipping the ideas into good ideas [27, 28]. Similarly, reverse brainstorming focuses on coming up with ways to make a problem occur, rather than on solving it [29]. Research suggests that such techniques may support designers to explore a broader problem space and overcome reluctance [27-29]. However, because such methods appear to leverage "negative energy" [29], they are often treated as "extreme" last resort approaches [30, 31]. Yet, artists sometimes create deliberately ugly or bad work; based on this, Dadich proposed that graphic designers ought to do likewise [32]. We argue that these approaches should not be reserved for worst cases. To this end, we developed a pre-ideation technique that leverages having terrible ideas. In using this technique, we have refined it, as we noticed that it seemed to lead to ideas that were jointly creative and empathetic.

Typically, empathic design is characterized as resulting from efforts to assess needs, including from multiple and marginalized stakeholder points of view [33, 34]. When such deep

engagement with stakeholders is not feasible, designers may engage in role play [35] or read scenarios about less common experiences to better understand them [36]. While such approaches can indeed foster empathy, they can also narrow focus, hindering creativity [35]. In developing the WTP, we sought to balance creativity and empathy.

The Wrong Theory Protocol

The WTP guides designers to first define a design problem, considering various stakeholders and their needs, as well as other design requirements (Figure 1). They are then tasked with coming up with terrible design ideas that would cause harm and humiliation. After generating terrible design ideas, they generate beneficial ideas.

Below, we share facilitation notes, followed by our evaluation process and results.

Figure 1. Overview of the Wrong Theory Protocol

Wrong Theory Protocol Facilitation Notes

There are two primary ways we have used the WTP: (1) As a pre-ideation technique with a group that is already engaged in a design process; and (2) to teach people the technique, such as at a workshop. In the former, they should already have gathered information about the problem. In the latter, the facilitator/instructor should also help attendees frame a design problem. As problem framing is difficult and unfamiliar work for many, one strategy is to provide a design brief that includes data and information that won't take too long to read, but will provide clarity about design requirements, allowing participants to identify needs and constraints themselves. Also note that for some groups, extra time may be needed for building trust and encouraging

them to take up the role of "change agent." When working with people who have had a role—even not as a designer—in an existing design that they seek to redesign, they may feel discouraged during the process. For example, when working with a group of teachers interested in bringing computer science into their courses, some felt upset upon realizing that aspects of traditional teaching and assessment practices were already humiliating for some students. We have found that such participants do not get much benefit from WTP without taking up the role of change agent, discussed in more detail below.

Next, we detail the WTP and sample scripts, given in indented italics, that we have developed and refined when implementing WTP. We always begin by setting expectations for generative activity.

Set the expectation for generative activity

Research suggests that the beginning of a class session or workshop sets the tone and expectations, and this in turn influences how participants engage. To set expectations for generative activity in which the emphasis is on divergent ideas rather than convergence to a "right" idea [37], WTP sessions begin with time for participants to each share an example of bad design. The facilitator introduces themself and shares an example of bad design they are responsible for. For instance, the first author often shares examples from her course design, when she "broke" the course in the learning management system or used a tool that was instructor friendly but mostly inaccessible to students. The facilitator then explains:

> *A great deal of insight can come from failure. Bad design helps clarify our values and needs when they are unmet.*

Next, the facilitator asks participants to each share an example of bad design—if they are willing, something they designed, but it is okay to just share bad design they have encountered. For large groups, they may just share examples of bad design with others at their table or nearby, but for smaller groups, they may share their examples with the whole group. In addition to supporting generative engagement, this can build a sense of community.

Set the purpose

In order to set the purpose of using WTP, the facilitator then explains that unstructured brainstorming techniques are not very effective:

> *Often, when designing, people get stuck. They have trouble coming up with new and good ideas or they get fixed on their first design idea. Today, we're going to try a technique called Wrong Theory. It might seem a little silly or wrong at first, but that's okay. The purpose of the activity is to help you really understand the problem and to see it from a different point of view.*
>
> *Often, our first design ideas are not the best, yet they can stop us from thinking about creative ways to address the problem. Designers use ideation—a word that comes from combining "idea" and "generation" to come up with new ideas. However, in our experience, and in the research literature, when we ask people to generate ideas, they often simply come up with flawed versions of their initial idea, which makes ideation busy work. Or, they get*

fixated on existing solutions without even realizing it. Instead, we are going to try wrong theory first, before you do a more traditional ideation technique.

As designers, we value both creative and empathetic designs. Design thinking encourages us to use empathy, but most empathy techniques tunnel our vision, encouraging us to focus on just one person's experience.

In past uses of wrong theory, we have found that wrong theory seems to work for several reasons. First, the pressure to have the "right" idea can prevent us from having good and great ideas. Wrong theory removes this pressure. Second, wrong theory helps us notice things about stakeholder experience and about the problem that we might not have missed. Third, after coming up with harmful and humiliating ideas, we feel beholden to stakeholders and commit more strongly to meeting their needs in empathetic ways.

Frame the problem

The WTP is only useful if there is already a design problem. The facilitator should assess the likelihood that participants will be able to quickly identify and frame a problem that they have influence over. When not embedded in a design course or projects, there are two strategies that can be used together to support participants to frame a design problem:

(1) Provide a handout to guide relatively quick problem framing by writing a problem statement and using the five whys technique, in which the designer repeatedly asks and answers "Why does this happen?" For more resources, see [38].

*Describe a problem related to your work/field. You must have some **influence over** it and be **knowledgeable** about it. What are the specific issues and impacts? Include who, what, when, where and why.*

(2) Provide design briefs for problems that are authentic, relevant to your audience and/or low-bar entry, making them easy for participants to understand and engage with (see example design brief in Appendix A). These should not be toy or fake problems, but instead, should be presented as unsolved problems that you are asking participants to help define and solve.

The facilitator helps participants understand that design problems, even when a design brief is provided, are ill-structured and not only have many possible solutions, but also can be framed as different problems [39-41]:

Design problems are different from other types of problems. They don't have a single right answer, but instead have many possible answers.

Inexperienced designers tend to jump straight to solutions because so much about our education and workplaces encourage this. Experienced designers dwell with the problem. They spend time with its ambiguity and take plenty of time to understand it. They try to see the problem from different stakeholder points of view. I'll be reminding you to stay with the problem.

If you have a problem in mind, use the problem statement and five whys approach to frame your problem. I encourage you to invite others to work with you.

If you don't have a problem in mind, I will also give you a design brief and I'd love to have you work on this problem.

The facilitator should take time to explain the problem in the design brief if there is one, and to emphasize the authenticity of it as an unsolved problem. Remind participants that as designers, they are responsible for framing the problem, and that there are many different ways to frame any design problem. As participants define their problems, the facilitator circulates, listening for solutions and reminding the participants to stay with the problem. It is helpful to give each participant their own handout and to ask them to work individually, as this can sometimes illustrate that even when working on the same problem, there are multiple possible frames. The handout should include the following questions:

- Stakeholder needs: What needs will your design solution address?
- Constraints & design requirements: What constraints do you need to attend to?
- Problem definition: Briefly describe the design problem you are trying to solve.

The facilitator gives a 2-minute warning to keep the pace going.

Trust-building and positioning as change agents

When working with groups who may feel responsibility for existing designs that already cause some humiliation, especially when they have lacked power to change the design, additional time should be provided to build trust and position participants as change agents. Previously, we used WTP with a group of teachers who felt ashamed upon realizing some of the designs they enacted (e.g., standardized testing) already caused humiliation, and this seemed to block their participation in and benefit from this stage. Later, with a group of urban planners, we added this framing and had high engagement and benefit [42]. The facilitator explains:

In past uses of wrong theory, we have observed that it works well when people engage playfully. However, some people feel uncomfortable in the process.

*WTP works for many different problems and groups, but it is dependent on your role and your engagement. Researchers have found that if your role makes you **feel responsible** for some form of bad design, you may feel less able to change it, or you may feel defensive. It is not uncommon in this WTP process for participants to realize that their current practice is humiliating to those they serve. Today, if you find yourself feeling this way, if you realize some part of your practice already causes some harm or humiliation, I want you to do the following: First, acknowledge that structural oppression is coercive and ubiquitous. Structural racism, sexism, and classism are difficult to resist. But today, instead of wallowing in blame, becoming defensive, or feeling helpless, I want you to own your role as an **agent of change**.*

*This is similar to bystander training. Research shows that if a sexual harassment prevention training only positions attendees as aggressor or victim, the training can backfire [43-45], but if attendees are invited to take up the identity of bystander, it can help change attendees' behavior. I want you to be more than a bystander. I want you to be an **agent of change**.*

Some people may feel uncomfortable coming up with terrible ideas. We bring diverse life experiences to the table today. As we propose harmful and humiliating ideas, we do so only as a commitment to coming up with more empathetic ideas and being change agents.

This positioning can help participants remember that if a harmful or humiliating idea is put forward, it is done so specifically as a harmful and humiliating idea, and with a goal of reaching more empathetic design solutions.

Generate harmful and humiliating ideas

After participants have concisely defined their design problems, the facilitator frames and illustrates generating harmful and humiliating ideas. Commonly, participants generate lazy ideas or need encouragement to "make it worse." The facilitator explains:

Now that you have thought about the problem, I want you to come up with a design that violates these and addresses none of the needs. The point is not to come up with a lazy design, but one that really is horrible. Come up with something that is worse than no design at all.

For instance, imagine you are designing a doghouse for a small dog. A lazy design would be one that the dog can sit in, but is too big, and has a roof that is not well sealed. It is still better than no doghouse. A horrible design would be one that has a roof made of sprinklers, a bed of spikes, and an audio loop that plays, "Bad dog!" in a voice the dog will recognize. It would be worse than no design at all. A terrible design should both harm and humiliate!

Some people may feel hesitant or uncomfortable about doing this, but it will help you understand the problem. Remember to engage playfully! Spend about 15 minutes and be ready to share your horrible design and defend why it is the absolute worst. You may work alone or with others.

In our experience, some students prefer to work alone, and others with a partner or in small groups. The facilitator should give them a couple minutes to get started, then circulate while they work, checking to see if their ideas would cause both harm and humiliation. Reviewing the needs and constraints may help participants to think about how they are violating those needs, rather than simply generating silly, completely unrelated ideas. Some will come up with injurious ideas quickly, then stop working. Ask them to add humiliation. Keep it lively with "Well, that's bad, but is it really the worst?" After 10-15 minutes, the facilitator should ask for volunteers to share:

I'd like to hear about some of your horrible designs. When you share, help us understand why your idea is the absolute worst. Let us know how your design violates a constraint or avoids addressing needs.

Have at least 3 people share. Congratulate them by saying, "That's terrible!"

Generate beneficial ideas

Once a few have shared, the facilitator shifts the participants to focus on generating beneficial ideas.

Now that you have come up with truly horrible designs, it is time to come up with beneficial ideas. I want you to stay tentative and try to come up with a few really different ideas. Don't focus on trying to get the best idea. Instead, try to be open and generative. Suspend judgment: don't discount or eliminate any ideas at this point. Try to come up with different ways to meet the needs you identified, not just minor variations of the same solution.

After 10-15 minutes, ask a few participants to share their beneficial ideas, including whether they noticed something about the problem they had not previously thought about.

Reflect

Reflection is an important part of the learning process [46]. Whether participants are learning *about the problem* or *how to do the process*, reflection deepens the learning. The facilitator should guide a reflective conversation or ask participants to reflect in writing. Consider questions such as:

- Can you share a little about how you felt as you went through the process, from defining the problem, to posing harmful & humiliating ideas, to coming up with beneficial ideas?
- Do you think coming up with ideas that could harm and humiliate change your understanding of the problem? If yes, how? If no, why not?
- Did coming up with harmful and humiliating ideas help you be more creative? If yes, how? If no, why not?
- Did coming up with harmful and humiliating ideas help you be more empathetic? If yes, how? If no, why not?
- How will you use the Wrong Theory Protocol in the future?

Methods

Participants included inexperienced designers enrolled in programs or courses that included significant design work (see Table 1) in the Southwestern United States.

In the baseline dataset, participants were teachers in a 7-week, intensive summer engineering research experience. They were given a design challenge developed with help from occupational therapists (Appendix A): patients with hypermobile wrists tend to be flexible; this flexibility comes at a cost to stability and strength, which makes opening doors challenging and sometimes injurious. The design brief provided constraints and quotes from patients, including describing their experiences of pain, their strategies for opening heavy or cumbersome doors, and that they tend not to wear braces because they otherwise appear normal and don't want to draw attention to their disability. The teachers completed the design challenge without the WTP, as the experience was intended to engage them in thinking about 3D printing within a design context, prior to proposing uses of 3D printers for their own classrooms. As reported previously, while their ideas about the design problem itself were not creative and displayed fixation, they were creative when considering ways they might use 3D printing in their own classrooms [47].

Iteration 1 took place at a project-based high school that emphasized design and construction. Their design challenge focused on providing temporary shelters from waste materials for homeless clients, whom they interviewed.

Iterations 2 and 3 involved students enrolled in design courses at a Hispanic-serving institution. In both iterations, they completed the same wrist hypermobility challenge given to the teachers.

We collected student work, supplemented with other data; this included a survey in iteration 3.

Table 1. Participants in a baseline and three iterations of the study. Unless noted, the Wrong Theory Protocol was used.

Setting (number of participants)	Description of design challenge
Baseline. Teachers in summer engineering professional development program (n=14)	Wrist hypermobility, no Wrong Theory component
Iteration 1. High school students at project-based school (n=27)	Temporary shelters for homeless clients
Iteration 2. Undergraduate design thinking architecture course (n=28)	Wrist hypermobility
Iteration 3. Graduate level biomedical engineering course #2 (n=15 students)	Wrist hypermobility

Results

Overall, compared to a baseline group who used typical brainstorming, designers who used the WTP produced divergent, empathetic ideas, suggesting the WTP supports creative ideation. We investigated how and if the WTP could help students overcome design fixation, using insights from the high school students who completed initial ideation and then the WTP to propose ideas for temporary shelters for homeless clients.

In the high school design challenge, students spent one week defining the problem by investigating the shortage of shelter space for men following the seasonal closure of a local shelter. At the end of the first week (six hours of instructional time), they were asked to brainstorm ideas for temporary shelters that could be built from found materials, including construction site waste. However, all students sketched pictures of cardboard boxes, and few drew more than one idea, despite being asked to draw four ideas. To remedy this, we instead asked them to come up with the worst possible designs they could envision. They proposed a wide variety of ideas. Seven student teams suggested ideas that were *lazy* rather than *wrong,* such as "a sheet stretched from a tree," "branches and a Hefty bag," and "just a bench." As their classmates described ideas that were truly terrible, like "a termite-infested tree house"; "a pile of twigs in the middle of a road next to an active volcano"; "live forever in a flaming car or just die now"; and a "tent of used toilet paper." Those who proposed lazy ideas laughed at how terrible the ideas were.

The teachers then asked the students to brainstorm again, but this time, students came up with many and varied ideas. Their ideas included wearable tents, hammocks, using culverts and other existing structures in combination with lean-tos or covers. Many students considered other features, such as storage—including for personal mementos and family photos, portability, and camouflage. In contrast to their earlier ideas, these were more creative and empathetic. While we were concerned about asking students, some of whom had themselves experienced

homelessness, to propose ideas that could harm and humiliate their clients, the students responded with a mixture of enthusiasm and concern for their clients.

We refined this activity into the WTP as used with iterations 2 and 3. In contrast to the wide variety of ideas students have proposed to the wrist hypermobility challenge, teachers who completed the same challenge—but without the WTP—all proposed braces, despite notes in the design brief that patients have poor compliance with braces and prefer to look "normal." While some have proposed braces following the WTP, these are typically in the form of temporary "grip gloves" or decorative bracelets that unfold temporarily to be used as braces; with the support of WTP, none proposed standard braces. This suggests that, as braces are a common enough form of precedent, WTP supported more modification to a common fixation than without (Figure 2).

These comparisons provided initial insight into the affordances of WTP for overcoming fixation.

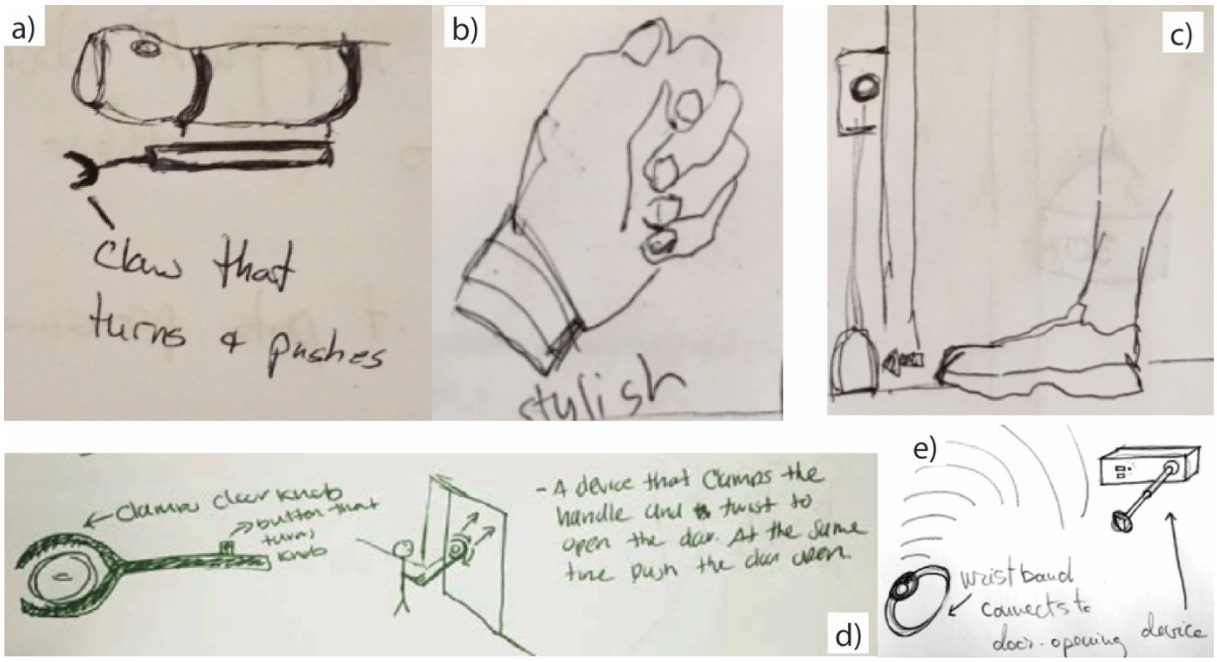

Figure 2. Examples of (a, b) braces, (c) levers, (d) foot-based, and (e) wearables students proposed as beneficial designs.

Perceptions of the Wrong Theory Protocol

We analyzed responses from students in iteration 3 who reflected in a survey on two questions:

- Can you share a little about how you felt as you went through the wrong theory process?
- After coming up with ideas that could harm and humiliate, designers tend to come up with more empathetic design ideas. Why do you think this might be?

Students explained that they anticipated it would be difficult, but found it easy (n=5) and fun (n=7). Some reflected that it was hard to propose ideas that would humiliate someone (n=3), and this aligned to our observations during the session. Students explained that WTP helped them

consider the problem more broadly than their own beliefs about the user's experience and recognize flaws in their beneficial ideas.

Students were eager to discuss why WTP worked for them. They conjectured that in order to propose ideas that could humiliate, they had to really understand the problem better and from the user experience (n=11, “putting yourself in someone else's shoes”; “easier to show empathy in design once the possibility of humiliation is considered”; “What could go wrong”). Thinking about such ideas made them feel more committed to not placing users in harm’s way or humiliating them. They felt that their ideas were more creative as a result of WTP, and one explained that this might be because “products aren't designed to harm or humiliate, so we can’t rely on previous ideas.” These comments suggest that participants found value in the WTP. Additionally, several students have followed up informally with the authors, reporting that after only one session that they have continued to use WTP.

Discussion

We found initial support for WTP as a means of supporting novice designers to generate creative and empathetic ideas. Here, we consider possible ways that WTP functions, including the role of failure and far ideas in provoking exploration of a broad problem space, the role of emotion, and ways WTP differs from other techniques that aim to capitalize on bad ideas.

WTP takes advantage of failure, similar to the opportunistic-assimilation hypothesis, which posits that impasses and failures during problem framing, followed by time for incubation, lead to novel insight [48, 49]. In the case of WTP, failure is deliberate and playful, rather than incidental and results in ideas that are far from the expected. As research has demonstrated that experience with uncommon or distal precedent can inspire greater novelty [20, 50], generating harmful and humiliating ones may provide a set of ideas that result in inspiration, broadening the problem space. In doing so, designers may consider ideas they would not otherwise have proposed. This includes ruling out ideas that may have unintended consequences. For instance, in the absence of WTP, participants all proposed typical medical device braces. While this may be a solution that is ideal from a medical practitioner point of view, poor compliance renders such ideas useless. In contrast, we found that when using WTP, participants consistently proposed braces that were empathetic in design. This finding is notable as supports for empathy sometimes come at a cost to creativity [35].

We also consider how WTP differs from techniques like the bad ideas method and reverse brainstorming, then consider why it might result in empathic ideas specifically. First, unlike reverse brainstorming, WTP asks designers to make the situation worse, rather than considering the conditions that can cause the problem. Though related in tone, we suspect that the effectiveness of reverse brainstorming is highly dependent on the problem type, and that without explicit supports, designers are unlikely to consider experiences other than their own.

In contrast to the bad ideas method, WTP specifically focuses designers on ideas that would harm and humiliate the user. While both approaches involve humor and involve deliberately considering bad ideas, thereby relieving the designer from the pressure of the “right” idea, WTP’s focus on harmful and humiliating experience helps designers to commit to considering user experience.

Another difference between bad ideas and WTP is that designers move immediately from bad ideas to beneficial ideas, without having to deliberately put effort into making their bad ideas good. Research on the bad ideas method suggests that facilitation through the process can actually interfere with the production of creative beneficial ideas [51]. We wonder, in contrast, if the strength of WTP is in its agility. It is possible that the quick shift from harmful and humiliating ideas to beneficial ones better leverages their emotional state.

Significance and implications

Those who teach design can use the WTP to support students to stay with the problem longer prior to becoming solution focused, to better understand and value stakeholder points of view, and to generate more empathetic yet creative ideas about such problems.

Having given WTP workshops in courses and communities, we have seen many participants continue to use the WTP after just one session. By providing creative commons licensed, share-alike resources [http://www.vanessasvihla.org/wrong-theory-protocol.html] faculty may use or adapt the WTP as they desire in their own teaching of design.
While our results suggest that WTP can support designers to generate more creative and empathetic ideas, our initial studies remain limited in scope. Elsewhere, we report on follow-up studies that add support, and future work will include experimental designs to contrast WTP with other similar techniques. Because this is a new technique, we do not yet have empirical backing for what might be most effective group size, or the conditions under which individuals, pairs, or small groups might make the most use out of WTP. Likewise, to date we have encouraged classical brainstorming techniques after generating harmful and humiliating ideas, relying on that stage to create near and far ideas to fertilize their brainstorming. Future research could also explore whether using a structured approach like SCAMPER or design heuristics might further enhance the process. We encourage those who use WTP to contact us about successes and challenges using WTP to grow our understanding of the conditions under which it works.

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Appendix A: Sample design brief

Design brief

Patients with hypermobile joints commonly have trouble with everyday tasks that present no challenge to the general population. Hypermobility results in increased flexibility. Patients commonly have decreased strength and are susceptible to injury from common activities due to instability. While physical therapy may be used to prevent or heal injury, many patients require support during therapy or have chronic injuries that do not improve with therapy. Assistive devices exist for activities that present challenges to the geriatric population, such as opening jars and cans. However, a range of everyday activities present challenges for those with hypermobility in the wrist and lack adequate assistive devices (Table 1).

Table 1. Common tasks that present challenges to patients with wrist hypermobility

Task	*How those with stable joints typically accomplish task*	*How those with hypermobility in the wrist typically accomplish task*
Opening doors that require force applied while turning a knob or a key	One hand smoothly turns knob or key while applying force	Two hands, one turning and one gripping, both applying force. Once initial opening accomplished, patient will quickly shift to hip, shoulder or foot to apply force. Multiple attempts common.
Opening heavy doors that require force applied as a push to the door itself	One-handed with a flat-palm push	Two handed, with fingers extended straight and locked, or with hip and shoulder push.

We have included transcripts of interviews with our customer pool describing their experiences:

"I feel like something is going to snap in that spot where my palm meets my wrist every time I open my office door. I have to turn the key from vertical to horizontal as I push the door. I usually use my foot to give it a good shove once I get the key turned."

"I do [physical therapy] exercises every day, but there has been so much damage, there is only so much the exercises can help with at this point. My biggest challenge is probably new-to-me doors. You never know how heavy a door is, that is new to you, how much you'll have to twist your wrist around to get it open, how much you'll have to push. Every new door is a full-body problem to solve. I have to have my hip and foot and shoulder ready, 'cause I never know what it's gonna take to get it open. And if I have anything in my hands—like a cup of coffee, it's probably better to just wait until someone else goes through the door and slip through after them, using my foot to catch it if needed, 'cause I certainly don't want to rely on my wrist for that."

"I have this brace I can wear, but it draws attention. I want to look normal. So I never wear it."