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Persona Multiplication: A Method to Avoid Designed Injustice

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Abstract: Although human-centered design (HCD), or user-centered design (UCD), is a foundational approach in a wide range of fields, sometimes HCD can lead to "designed injustice"—where products or systems facilitate unjust outcomes in society. Here, we present a new method, Persona Multiplication (PM), which helps designers avoid some of the dangers implicit in traditional HCD. PM helps guide designers through an evaluation of the implicit (or potential) designed injustice early in the design process. Our approach is grounded in traditional HCD methods as currently applied across a wide range of fields, including Product Design (PD), Human Factors Engineering (HFE), User Experience Design (UX), and Human–Computer Interaction (HCI). PM involves adding a new "multiplication and evaluation" step in the design process—just after standard persona-development. This step helps ensure that the design space includes a broader set of personas and use-cases to help avoid designed injustice. Through a series of case studies, we demonstrate how the method can be applied across a range of design domains. We hope to inspire further development of additional tools, methods, systems, and processes to help ensure designed injustice occurs less frequently over time.

Keywords: *Design Justice, Equitable Design, Personas, Methodology, Design Thinking, Applied Theory, Product Design, Persona Multiplication (PM), Social Justice, Transversal Design, Designed Injustice, Human Factors Engineering (HFE), User Experience Design (UX), Human–Computer Interaction (HCI)*

Background: From Personal Design to User-Centered Design

Perhaps the earliest roots of design involved true experts, with deep lived experience, designing tools that made their lives better, safer, and easier. Bakers, jewelers, blacksmiths, farmers, and mechanics, all designed tools that helped them excel at creating better products, services, and processes. These "makers" developed artifacts primarily for their own use; therefore, by definition, they were practicing an early form of "user-centered design."[1] These "makers" designed artifacts that worked perfectly for them—the user.

Extending the end-user space from one (just me) to a wider group (e.g., other jewelers), the designing expert could use their empathy and understanding to do something more akin to the current form of user-centered design. If the designer was aware of other users with different abilities, desires, needs, and so on, they might include them in their overall design space or process. For example, a left-handed blacksmith might design a tool for their own use, but being

[1] We considered using other terms, such as human-centered design or user-experience design, but ultimately decided to leave this concept as broad as possible. There is design for lots of "things/systems/experiences" outside of the human; think of designing for dogs, or robots, or trains, or algorithms, or windows that birds won't crash into.

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aware that most blacksmiths are right-handed, they might also design it to be usable by righties. In fact, those blacksmiths with deep expertise might also be aware of the abilities of other users/experts who are working in different but similar contexts and design with those abilities, constraints, and opportunities in mind. As such, the cello maker designs for a violinist or the blacksmith designs and distributes the left-handed version because they know anyone who uses it would have the skills required to easily convert it to right-hand use.[2]

Over time, designed products have come to be produced by individuals increasingly distant from the end-users, a process greatly accelerated by an increase in mass production and distribution since the dawn of the Industrial Revolution. As a result of the changing times, designers began to develop new methods to design across domains. For example, the method of "task analysis" could be applied across a broad range of domains from the physical (bricklayers), to the cognitive (pilots), to the emotional (social robots) (Intriligator 2021). The method of task analysis could be used in almost any design space. The phrase "starting from the user" captures the idea alluded to above: good design is "user-centered design" (UCD). If you're designing something for a blacksmith, they had better love it; if you're designing for a surgeon, they (and regulatory agencies) had better love it. UCD is currently considered best-practice and is applied across numerous disciplines (Lyon, Brewer, and Areán 2020). It is almost impossible to imagine any project where UCD would not be used as a place to start (and end!) the design process.

Introduction: Personas and Their Dangers

Best-practice UCD asks the designer to begin by identifying the user(s) and then move toward a solution by researching, designing, and developing a user persona. Perhaps it will be "Doctor Drew" or "Architect Alex" or "Collaborative Charlie." The Nielsen Norman Group, resident experts on all things UX, described personas as "…a quick, empathy-inducing shorthand for our users' context, motivations, needs, and approaches to using our products. They are meant to help us focus on what matters most to our users and put ourselves in their shoes when making design decisions" (Laubheimer 2020).

Once the persona is developed, it, or perhaps a small set of personas, will then inform and guide future research, design, and development activities. The Greek philosopher Heraclitus said, "Character is destiny." In the world of design, we believe that *persona* is destiny. The initial persona(s) will direct and inform all subsequent research, investigations,

[2] This line of thinking can be extended to include issues around customization. For example, in some cases the dimensions for customization can be crafted either narrowly or broadly. It is easy to customize the background of a computer screen and, since it was intended for "WIDE customization," it required easier interfaces/processes for customization (anyone should be able to do it). In comparison, "overclocking" a GPU is much harder, nerdier, and will likely require investigation into fewer personas and fewer design considerations; as a result, the final interfaces/processes can likely be less user-friendly.

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observations, user journey maps, task analyses, requirements gathering, needs understanding, interviews, usability testing, and numerous other design-related activities.

In most design processes and methods, once the user/customer personas are developed, the designer then focuses all attention on researching and designing *to*, or *for*, that set of personas. Once the personas are declared and the development begins, the entire process has a chosen direction and momentum. It has been launched down a set of investigative/expansive paths that will lead to a final artifact (Reynolds and Intriligator 2003).

A successful "design launch" is a wonderful outcome of persona development, but there will be many cases where the launch trajectory encounters problems. For example, problems may occur if the persona(s) fail to accurately cover the artifact user space. Ideally, the intended user set (set of possible users one is designing for) must accurately represent all users across all relevant use/interaction dimensions. If sets of users were not represented in the persona space, then it is possible that their unique needs, fears, abilities, preferences, and ways of being were not included in the design space. So, the developed persona set must represent all relevant individuals. Others have shown that personas do not often represent *any* actual individuals in the target user category (Chapman and Milham 2006)! However, the fact that personas may not represent anyone is just the beginning of the potential pitfalls with persona-guided development. Some of the problems with personas can be seen in Table 1 and easily remembered with the DOTMET mnemonic. It is worth noting that others have suggested alternate forms of persona development (e.g., based on a statistical approach) that may avoid some of these problems (Chapman et al. 2008).

Table 1: Some Potential Challenges and Opportunities Arising from Personas (DOTMET)

	Definition	*Example Design Error*
Static versus Dynamic	Static personas offer a description of the persona within a narrow range of "slices" of space, time, situation, and culture. Dynamic personas elucidate—in a dynamic and fractal way—the persona as it transversally cuts across space, time, and situation.	Designing a travel app for business travelers that fails to recognize persona mutations as the user travels to known versus unknown cities.
Closed versus Open	This is not specifically a problem with personas; instead, it is a sort of meta-issue around the use of personas. Closed designers (or design teams or management structures) create challenges and a "multiplier effect" from acting as "persona fascists." Specific problems that can arise, or be further problematized, include those listed at right.	1) Only design/develop toward one (or too few) persona. 2) Always stay within scope—having a myopic focus. 3) Become blind to (or stop looking for) changes in society, systems, users, or even the persona/target. 4) Stomp down (stymie!) innovation by repressing broad changes to product design.

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Shallow versus Thick	Shallow personas offer only a superficial description and understanding. In a rich or thick persona, in addition to understanding basic behaviors and activities, the psychological and social motivations that underpin them are also elaborated.	An oral health campaign promoting better toothbrushing techniques designed for a community that cannot afford toothbrushes or has no knowledge/tradition around toothbrushing or does not recognize the importance of preventative oral health (Tynan et al. 2020).
Myopic versus Multi-Perspective	Myopic personas are developed from only one perspective or point of view. This often happens when personas are developed by one designer (or a small group of designers). Multiperspective personas originate from open, multivocal, and multidisciplinary teams.	Many aspects of modern educational systems were designed by (and for) a limited range of student persona types. Although the system is still very poorly designed for those outside the majority, things have been improving as more diverse voices enter the educational sphere (Martin 2014).
Narrow versus Expansive	Narrow personas offer a description of the persona only across a limited range of important, relevant, or related dimensions. Expansive personas can inform and capture the persona across a wide range of relevant and related dimensions and situations.	A sign with critical health and safety information is printed with tiny text that requires perfect vision. Not to mention the possible need for braille or other options for individuals with low/no vision.
Outdated versus Timely	Outdated personas offer a description of the persona as it exists now or as it was understood within recent/traditional parameterizations of the conceptual spaces. Timely personas recognize the fluid nature of encompassing realities and are continually updated (or fractionated/fused).	Blockbuster continued to design for their customers —rather than adapting their business model to the changing socio-technological culture in which their personas were embedded.

Source: Pearl and Intriligator

Putting aside the problems discussed in Table 1, how does the persona-guided design process continue? Following the notion of "persona is destiny", after the designer has elucidated the personas, they then pass the personas along to others to continue development. For example, perhaps the design team develops a persona (or personas) that represent the target user (or other stakeholders) for a new software package. These personas will likely lead to, or at least heavily inform, the development of product requirements, marketing materials, and channels of advertisement. Imagine the further magnifying effect of the persona trajectory when the marketing team uses them to develop marketing messaging and materials that "speak to" and "motivate" target consumers. Marketers might also choose specific channels to gain exposure to the target market and leave others out. From the drawing board

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through research, development, manufacturing, sales, and support, the personas will set the trajectory for major product decisions.

There are many cases where personas have led to problems, including cases of "designed injustice" where the product or system leads to either unjust/unfair disadvantages to some (e.g., racist loan decisioning) or perhaps unfair/unjust advantages to others (e.g., face recognition systems that only recognize light-skinned individuals). As will be discussed below, these injustices arose in large part due to poor training data; however, we argue that, in many cases, the training data were selected, cleaned, and curated based on personas (whether they were explicitly part of the process or implicitly driving the collection of data).

Sometimes, and perhaps more frequently than we care to admit, the designed injustice was the intent of the designer (e.g., redlining). However, sometimes a product or solution could be a case of what we term "unintentional designed injustice" where something is designed with the best of intentions—following industry best-practices—and then, when released into "the wild," leads to designed injustice.

In many designed products/systems, designers are not intending to design a system (product or process) that can lead to social injustice. However, while conducting research, "dangers can emerge when and if researchers do not engage in processes that can circumvent misinterpretations, misinformation, and misrepresentations of individuals, communities, institutions, and systems" (Milner 2007, 388). Today, we have racist loan evaluation systems (Glantz and Martinez 2018), and machine learning algorithms that only recognize white faces (Lewis 2019), and soap dispensers that cannot "see" black or brown people (Plenke 2015). Clearly, there is still room for improvement in both research and design as most people believe that artifacts and systems are not *explicitly* designed to create injustice. Rather, there must have been some error or byproduct or calculation or training or fluke or oversight that led to unintended consequences.

It is this very problem of unintentional injustice that we are trying to solve: We need to make it less likely for such unjust systems to be designed, created, and released into the public sphere. For that to happen, we first must understand how such systems were released in the first place. We believe that, in many cases, these systems arose because somewhere along the line, someone designed and developed around an inadequate persona group. The purpose of this article is to point out that there are numerous and multifaceted factors that contribute to designed injustice. In addition, we offer one method for eliminating some factors related to (overreliance on) inadequate personas.

So, what does it mean to design around an inadequate persona group? The modern loan system was designed to serve the needs of particular personas, and it was constructed or trained based on data (current, synthetic, or historical) representing those personas. The soap dispenser light sensor was calibrated to the hands of the engineers in the workshop or to the hands of a narrow group of users (representing target personas) brought in for user testing. The face recognition software was trained on faces taken from online databases. At some point, someone decided that those databases adequately represent or capture the persona(s)

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of interest. In all of these cases, everything was done "correctly." Teams put hundreds or thousands of hours into designing wonderfully complex systems. Yet, sadly, they had been launched on a design trajectory that ultimately led them to inadvertent (or in rare cases intentional) design injustice.

Research, design, and development leading to such tragic, potentially life-versus-death outcomes should not be allowed to happen. Clearly, designers have a moral obligation to focus on developing more methods to ensure that designed injustice does not occur. This need is rather urgent, and ethically, we cannot wait and hope that unjust systems never emerge, we must tackle the designed injustice epidemic head-on.

To address concerns about designed injustice, we have developed a method that we believe may help designers create more just products, experiences, and systems. We have no illusion that our method is a silver bullet of any kind, but we hope it inspires new ideas for new ways to design. In essence, what we are suggesting is that after the design team has finalized the persona(s), they need to insert a pause before launching the rest of the research, design, and development activities.

The broader design team, ideally including other cross-functional partners with a diverse background, needs to look at the personas and ask, "if we only developed for this person—or for those fairly similar to this person—will we be creating unfair advantages or disadvantages in the world?" For example, if we only make this size chair, who will not get to sit? If we only make the system accessible via smartphones, who will not get to use it? If we train machine learning algorithms only on these data sets, which groups or individuals will be left behind? If we only make films from a traditional male perspective, how much of society loses out—and how much of society unfairly and unnecessarily gains?

Our method to help the design team perform detailed, robust, and systematic investigations into improving personas is called Persona Multiplication (PM). We believe that incorporating PM into the design process can ensure more equitable and robust outcomes for designed products, systems, and experiences.

The Persona Multiplication (PM) Method

PM Stage 1: Persona Multiplication

After creating your initial set of personas, as the name suggests, you must "multiply" them. You must investigate the impact of varying different aspects/dimensions of the persona. A classic, but useful method for investigation is through the simple question (often repeated as necessary to dig deeper into a problem space): "what if…?" What if they were a different gender? What if they were a different size? What if they spoke a different language? What if they were differently sighted? What if they came from a different cultural, social, or ethnic background? As you multiply, be sure to consider traditionally marginalized groups, by thinking of a range of genders, ages, sexualities, income levels, classes, ethnicities, languages, physical makeups, abilities, and so on.

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How many permutations and combinations of traits must you investigate? And what about issues around intersectionality—when individuals are part of a combined mosaic of many traditionally marginalized groups? Surely the range of combinations becomes infinite, and designers can only devote so much to this activity. Of course, there are no hard-and-fast rules to calculate the exact required number of dimensions/combinations to investigate. Additionally, any strict rule(s) would fail to be responsive, dynamic, and adaptive—something we are advocating for very heavily. We have therefore developed an initial set of *heuristics*[3] (or rules of thumb) to guide the investigations into a range of personas:

- ***Systems of Increasing Complexity Require More (Attention to) Personas.*** More complex systems require more attention to the details, attributes, and dimensions inherently cultivated or ignored in the creation of user personas.
- ***Systems Designed for More Types of Users Require More (Attention to) Personas***. The more heterogeneous the group, the greater number of personas will be needed. This could be approached from a somewhat mathematical mindset. If we are trying to cover a wide range of users, across a large number of relevant dimensions, then we will need enough "points" (or personas) to adequately represent the underlying persona planes.
- ***Systems That May Lead to More Serious Consequences Require More (Attention to) Personas***. The consequences of designing a game or library management system with a limited set of personas will be less severe than, for example, a system related to finances, health, prison sentencing, or heating/cooling.
- ***Systems Designed to Stand the Test of Time Require (<u>Extra</u> Attention to) Personas That May Not Yet Exist***. If designing a product that will exist for a long time, one should devote extra effort to ensuring it will still be usable for a long time. For example, one might argue modern cars have a lot of technology that will become obsolete in a few years.
- ***Systems Designed to, for, or around Physical Traits of the Users Require More (Attention to) Personas***. If you are designing a product or system that relies on aspects of the user's physicality, then extra care must be taken to ensure equity. Traditional round door handles were designed around the physicality of well-functioning average hands. Urinals in public bathrooms put at "average waist height" were not designed with children or wheelchair users in mind. And, as mentioned previously, soap dispenser sensors designed for "average hand reflectance" can disadvantage millions of brown-skinned users.

[3] These are heuristics in the sense of "rules of thumb" per the definition from the APA.

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PM Stage 2: Impact Considerations

After deciding on a set of relevant multiplied personas, it is important to consider each of the personas defined by your permutations and/or combinations of traits.

	G_1 (Group, Persona, etc.)	G_2	…	G_X
S_1 (Scenario, Function, etc.)				
S_2				
…				
S_Y				

Figure 1: Complication Matrix

Figure 1 presents a "complication matrix" that summarizes one way designers might systematically analyze the various personas that emerge from the first phase of PM. Along the top, you can see the various groups (G1, G2,…) or personas that came from Phase 1 of PM. And, down the side, you will see some of the scenarios (S1, S2,…) or functions that must be explored for each group. The scenarios might well include such things as hearing about the system, finding the system, accessing the system, using the system, and so on.

For each combination (G_X meets S_Y), you must ask questions about the system being designed and how it might unfairly (dis)advantage each group of interest. Consider an example: Perhaps one user group is users who are blind (G_1: blind users) and one scenario to be considered might be S_1, "finding the system." Will blind users be able to find the system? The same question might be asked about accessing the system, using the system, and so on. And, at the highest level, one should ask for each group whether the *overall* use, function, or results of the system will unfairly disadvantage or unfairly advantage them or others?

An example will make this process clearer. Assume we are designing an online system to help people find NAAT COVID-19 tests nearby. As the first question above suggests, you should ask "will <these users> be able to actually know of (hear about or find) our system?" For example, how will a <non-English speaker> know/hear about and find the system? Would a <person living on the streets> be able to know of and find the system? Could <individuals who are visually or auditorily challenged> see/hear the ads you plan? How might a <single parent>, <nightshift worker>, or <Native American living in a rural setting> hear about and find the system? Would the system's name, advertisements, brand, look and feel, interface,

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technologies, recommendations, means of access, or sources of data help <people in Group X> hear/know of, find, and feel the system is right for them?

Additionally, even if the multiplied personalities can successfully hear/know of and find the system, will they be able to ACCESS it? For example, do they need a smartphone, web-browser, normal vision, or a mastery of the English language? Even if they successfully find the system and access it, will they be able to use it? If a <90-year-old living in a nursing home> heard of the system, found it, and managed to get into the system, could they navigate the interfaces and make informed selections and decisions? Would the information presented be useful and usable to <the person/group of interest>? Is the terminology unduly complex or specialized? Is the tone of voice right for the group/actions of interest?

The broad research and design team(s) must perform an examination and discussion of each cell (the intersection of the group and the scenario). The team(s) do this for two reasons: first, and most immediately, to identify potential (implicit or explicit) design injustices that could emerge as they set the ever-important initial design trajectory. They also perform these investigations (and have these discussions) to ensure that everyone is "on the same page" and that they have considered all the potentially important groups and scenarios.

The basic PM approach is straightforward: Multiply along important dimensions and look for potential injustices. Of course, the devil is often in the details. We therefore present a few case studies to help elucidate the method and its application.

Applying the PM Method: Case Studies

Now that we have seen how the overall PM method works at a high level, a few case studies may help make the process clearer and highlight some of the nuances, benefits, and risks associated with this method.

Case Study 1: Water Faucets

The design of modern-day water faucets (or soap dispensers), especially in industrial settings, now often include sensors designed to sense motion and then turn on the water for a specific duration. This helps to cut down water usage, reduce touchpoints (especially important during COVID-19), and create a cleaner aesthetic. However, if the faucet's infrared sensor is not calibrated correctly then it will not work well for folks with darker skin tones. As Bethlehem Gronneberg, Founder and CEO of uCodeGirl discusses, "the installation and calibration of that particular bathroom sensor design didn't include me. I wasn't the problem" (Gronneberg 2020). It doesn't take much thought to realize there is an inherent (perhaps implicit) injustice in the design—a large portion of the population is now unable to easily wash their hands.[4] PM's framework would have prevented this issue, by simply

[4] The problem isn't unique to faucets and can be found commonly in today's wearable research from companies, including Apple, Google, Samsung, and more. While current sensors are adapted to work with lighter skin tones, it seems that bridging the gap to design products that are more inclusive is a concern for these companies.

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forcing designers to think one or two levels deeper about the intended population, the folks setting up the faucets, and how the whole system needs to function "in the wild" to avoid unintentionally designed injustice.

Case Study 2: Machine Learning and Photography

How does autofocus on a classic mirror-less camera system work? It looks for a face! Well, how does it know what a face is? The system must be trained. Building on the photography story, it turns out that modern-day photography is rooted in narrow and racist (whether intentional or not) persona development. In the early days of film, the camera settings (exposure, f-stop, etc.) were adjusted to a standard "Shirley Card" picture featuring a white woman (Lewis 2019). This image—the literal representation of a persona—was "normal." The cameras would be calibrated around how a white woman would look in a certain background, lighting, environment, and so on. Fast forward several years to the introduction of the digital camera, or even to today's modern digital smartphone cameras, and what is the result? Until efforts of the last few years, nonwhite individuals look too dark or washed out: The image quality is often subpar compared to their lighter-skinned counterparts (Latif 2017). Part of this is the fault of designers who built upon past approaches without thinking about their past roots and future implications. And part of this is the fault of those who trained the internal auto-setting machine learning (ML) algorithms.

Where machine learning is concerned, the old saying still applies: garbage in, garbage out. But when systems are designed to be used by a wide range of users, it sometimes becomes—racist in, racist out. Many companies have blundered over the years with well-known accounts of everything from computers to cameras being called racist (Rose 2010). The problem with machine learning and its increasingly commonplace application is that it creates a complexity and simplification duality based on how it is trained. In the case of photography, what we've seen is that a ML-based face detection algorithm may easily detect a white person's face but struggle with nonwhite faces. So, some may say the solution is as simple as having a better set of training data (the original images for the ML that taught it what a face **is** or **is not**). To an extent, that may be true. But the larger, and the more general, solution is to approach the design process with more considerations of potential user groups and the practice of purposeful design.[5]

Case Study 3: Loan Decisions and Racism

As the finance industry grew there was a desperate need to make faster and more accurate loan decisions. Automated loan-decision systems were needed. As noted by the ACLU, the "impact on the daily lives of Americans is unprecedented. Banks and other lenders use AI systems to determine who is eligible for a mortgage or student loan" (Klein 2020). In 2021, "one study [in the Journal of Financial Economics] reported that borrowers from minority groups were charged interest rates that were nearly 8 percent higher and were rejected for

[5] Consider watching the film Coded Bias for more information.

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loans 14 percent more often than those from privileged groups" (Zewe 2022). The lack of focus on issues like this, especially in newly built systems, stems from the notion that these issues will (or should be) addressed with good data inputs; that may be true, but more checks are needed so training data will not be used as a crutch to prevent designed injustice.

Designing and building such a system required analytics (e.g., for expert systems) and/or training (for ML systems). No matter how a system gets built, it requires some kind of "training data" (or calibration parameters). Of course, those building such systems used any and all available training data. Sadly, often past decisions/actions were influenced by implicit or explicit racism (Moore 2021). Thus, any historical training data used to craft the system will already contain the manifestations of racism. In addition, the number of training cases might be very low (and not very representative) for certain subsets of the population.

If the designers of such loan-decisioning systems had employed the PM method, they might have realized this potential as they examined the permutations of personas and system access, use, decisioning, and training. Some researchers have identified this problem and have made clever attempts to ameliorate it from a computer science perspective (Zewe 2022).

Conclusions and Future Directions

In our data-driven and increasingly algorithmically designed and controlled world, it is necessary to pay close attention to the design parameters informing design. In many cases, we need to question the status quo and reexamine, reevaluate, and redesign systems now to avoid a future with rampant issues deeply ingrained in society.

Whether looking at tools designed for the general population that fail to perform for a large subset of the population (e.g., faucets and dark-skinned individuals) or policing systems that emerged from racist roots (Heaven 2020) or chatbots designed to learn from people online (Vincent 2016), the dangers of persona-led design can be found everywhere.

The PM model isn't meant to solve all problems with personas, or with equitable or inclusive design. Instead, PM is just one method to help make inequitable design less likely. In short, this article is about challenging the status quo of UCD to promote methods that lead to more equitable and inclusive design. Furthermore, applying the PM method, in concert with other concepts and forces, for example, positionality,[6] will lead to much better outcomes and allow designers and researchers to find better (more inclusive and more equitable) solutions to design challenges.

The PM method is meant to be a set of guidelines with room to be applied across various use-cases and domains. It is impossible to conceive, in advance, all the possible specifications for a method that explicitly forces us to consider (in more depth) the personas we do—and don't!—design for. However, Table 2 lists some potentially fruitful directions for future research and development.

[6] Positionality is the social and political context that creates/informs your identity and how your identity influences and biases your perception of and outlook on the world.

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Table 2: Some Potentially Fruitful Directions for Future Research and Development

- How does the PM method translate across design/research domains?
- How might the PM method (or documentation around the method) be expanded to ensure others (in later phases of design) know:
    - The PM process was performed, who/what was considered, what challenges were designed around?
    - Which dimensions are free to vary and by how much? and which variations would require additional design research?
- How might the PM method be expanded to ensure others know the PM process was performed and relevant investigations took place?
- How does the PM method work at smaller companies, with UX teams of one, or if people lack context, data, or both?
- How can we create open-source sets of personas based on PM for common designing problems?
- How might we use big data and other analytic methods to develop and explore personas—especially those that might change over time/situations as the needs, aspirations, wants, and so on of the intended user(s) change?
- How might we create dashboards that can respond to population changes (psychographics/demographics) to help inform, enrich, and explore personas and the PM model?
- How might we create systems that are able to learn and evolve to move beyond their current limitations or even systems that aren't gendered to begin with (e.g., "Hey Siri, you should have been able to do that" or "Hey Siri, why are you so bad at recognizing female voices?")?
- Personas might require a deeper and more nuanced understanding of the human: body, mind, and experience.

In closing, we believe that PM is one method that can help avoid designed injustice. We believe it is incumbent upon professionals to expend more time and effort on using and developing additional methods aimed at achieving the same ends. Part of our professional responsibility is to ensure universal, just, and equitable design. Currently, there are very few (if any) guardrails in place to ensure that unjust systems do not come into use. We must develop, teach, and use methods that could help us achieve those ends.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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