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Systems for Innovation: Towards a model of requisite variety through intercultural conversations

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In today's working environments, collaborative teams are composed of diverse individuals—from different cultures, nations, religions, and racial and ethnic backgrounds. Thus, there is an urge to understand and embrace differences. Yet, many teams and organisations fail in this endeavour because they lack specific tools to benefit from the power of diversity. In this paper, we present case studies from applying systemic design principles for designing for intercultural conversations as a way to embrace requisite variety in flexible and collaborative ecosystems. We describe a workshop experience that acts as a microcosm of a design team experience. The workshop allows participants to experience a system that is open to a variety of inputs and demonstrates the diversity of perspectives that may meaningfully apply to simple abstract artefacts. This paper shows how surfacing a variety of mental models through objects is both possible and effective in cross-cultural teams. In doing so, we demonstrate how design teams can endeavour to look at a problem space from multiple perspectives, benefiting from the power of diversity. The results include a general understanding of different interpretations of culture and boosting openness to otherness and intercultural awareness. As contemporary workplaces continue to diversify, developing a richer understanding of the value that cross-cultural teams can bring offers a path towards a more positive working environment.

KEYWORDS: systems thinking, design research, conversational design, cross-cultural design, cybernetics, conversation, intercultural, systemic design

RSD TOPIC(S): Cases & Practice, Society & Culture, Sociotechnical Systems

Introduction

Cross-cultural team working can be fraught with misunderstanding, silencing of minority viewpoints, inadvertent assumptions, and missed opportunities. But done well, a diverse team can be a powerful resource for designing robust products and services. If well managed, a diverse and collaborative team can positively impact the organisation, boosting productivity, creativity, and overall company performance. In contemporary working environments, collaborative teams are often composed of people from different cultures, nations, religions, age ranges, gender, professional experience, and racial and ethnic backgrounds. Thus, there is a growing need to understand and embrace differences. Yet, many teams fail in this endeavour because they lack specific tools and techniques to engage the power of diversity.

On cross-cultural teams, expertise is lost through mismatched salience (Collins, Evans 2007) and defensive behaviours (Watt, 2007). Lack of trust affects collaboration and team performance (Erdem et al., 2003; Hannesdottir et al., 2014; Morel, 2014). Teams often focus on the shared aspects of team members' backgrounds or what is common to team members (Janis, 1972) rather than leveraging each participant's unique expertise. This is not a new challenge. Convening people to work cooperatively has been a challenging problem for decades. Horst Rittel's (1970) issue-based information system, Susan Leigh Star and James Greisemer's (1989) boundary objects, as well as a whole host of co-design (Sanders & Stappers, 2014; Peters, Loke, Ahmadpour, 2021) and deliberative practices (Legacy, Curtis, Newman, 2014; Elwyn, Tsulukidze, Edwards, Légaré, Newcombe, 2013; Nabatchi & Leighninger, 2015), reflect the difficulty of cooperative designing across boundaries and cultures.

To better understand the terms cross-cultural and intercultural, we draw a distinction from previous research. There is a slight difference between understandings of multicultural, cross-cultural, and intercultural. The Spring Institute (Vargas, n.d.) is an organisation specialising in Intercultural learning programs and diversity training. They describe 1) Multicultural as a society with different groups of cultures that may or may not be interacting with each other; 2) Cross-cultural as a society that is more open to other cultures, is aware of differences among groups, and begins to embrace them, but there is no deep interconnection; 3) Intercultural as a society in which different ethnic and cultural groups deeply understand and respect each other. In addition, Novinger (2001) uses intercultural and cross-cultural interchangeably. For the purpose of this paper, we will use the terms cross-cultural and intercultural to refer to the skills that help people step away from being in a multicultural group and move towards interacting better with others from different ethnicities and cultures (Ciliotta Chehade, 2020).

Conversation plays a vital role in these interactions and in supporting design research and design practice. Interpersonal, verbal communication, and the spoken word serve as the primary medium of data collection in design's dominant research methods: think-aloud protocols, focus groups, and ethnographic and phenomenological interviews. Codesign practices, both agonist and deliberative, centre upon conversations with community stakeholders as the principal method for discovery. In the design studio, practices of brainstorming, presentation, and critique all adopt conversational aspects. Conversations also serve an important role in client meetings. Donald Schön (1992) describes design practice as conversations with the situation. Michael Geoghan, Paul Pangaro, and Hugh Dubberly (2002) discuss organisational innovation and developing practices of creating new conversations in an organisation as the most important way to foster innovation. However, it is Ranulph Glanville's reading of Gordon Pask points to the fraught-yet-powerful aspect of conversations in design contexts that we approach in this paper: "It is in this difference that novelty can be seen to arise: indeed, it cannot but arise. Thus ... if we construct our meanings differently, we cannot assume our individual understandings will be the same. Therefore, every time my conversational partner expresses back to me his/her understanding, I must assume it will be in some way different from mine." (Glanville, 2007, p. 1190)

Variety as a resource

Difference between designers is often seen as a problem to be overcome. Design teams are encouraged to focus singularly on the problem definition and the design solution. The well-known and much-lauded double diamond model (Stickdorn et al., 2018; UK Design Council, 2015) is just one example of the many culprits encouraging this singular view of design situations. However, we argue that the most valuable addition to contemporary design practice is, as Björgvinsson, Ehn, and Hillgren state, “a common place where conflicts can be negotiated ... motivated by a diversity of perspectives, concerns, and interests.” (2012, p.102). Yet the cultural difference is oftentimes still seen as problematic, with an unfortunate normative force steering teams towards dispassionate speech styles, towards those of “white, middle-class men ... without significant gesture and expression or emotion” (Young, 2000, p. 39). Seeing culture—specifically workplace culture, organisations and teams—as systems within systems where the complexity of diverse stakeholders, resources, and interactions abound adds to the complex nature of cooperative work. Schein (2004) and Rosinski (2003) define culture as a multi-layered complex system (Figure 1). Similarly, Novinger describes culture as a set of perceptible but mostly invisible conventions—“knowledge, experience, meanings, beliefs, values, attitudes, religions, concepts of self, the universe and self-universe, relationships, hierarchies of status, role expectations, spatial relations, and time concepts” (Novinger, 2001, p. 14).

In navigating these complex systems, Buchanan (2019) addresses the importance of utilising systems thinking to identify, define and apply design principles—good, just, useful, and satisfying—within which we can create better worlds and experiences for all. Similarly, Peter Jones (2014) draws intersections between systems theory and design methods to reflect on the importance of applying systemic design principles when interacting with complex systems and, thus, social systems such as intercultural teams and organisations. When framing the act of the design team, Jones states, “Whether in a social system or information system, the functional complexity of a given design must match the complexity of its target environment. However, in design terms complexity is not desirable, and the environment is not an objective reality of physical operations.” (p 113) While finding both statements to be accurate and reflective of our own experiences

of designing things to function in the world, the composition of an effective design team is a slightly different challenge than the production of a completed design artefact.

To better foster collaboration within this multi-layered complex system, Rosini and Barbero (2022) provide us with a framework to give organisations tools for a more strategic systemic design approach, helping managers open working spaces to diversity and complexity more successfully. Rather than seeing complexity as something to be tamed in the workplace, we argue that the variety of perspectives is a resource that offers the organisation more resilience and flexibility when encountering a problem space. Furthermore, we argue that organisations can design ways to promote and nurture this variety of perspectives by thoughtfully considering interventions that promote cross-cultural conversations and experiences in the workplace. In order to be successful, organisations need to promote openness and design a workplace culture that facilitates these intercultural interactions. When companies and organisations commit to this workplace culture, stronger relationships, better decision-making, and innovations are more likely to emerge (Ciliotta Chehade, 2020).

In sum, in culturally diverse workplaces, working with diverse team members may add some complexity to the interactions, but a nuanced and somewhat contradictory position is the goal. Ideally, teams will focus on finding commonalities among the members, yet also transitioning from seeing differences — not as a challenge to resolve, but as a source of strength, resilience, and flexibility. Iris Marion Young (2020) describes this nuanced position as “listening across differences” (p 403), where knowledge is gained by all group members by engaging with different framings, consequences and social locations of participants. Thus, designers may be able to create a welcoming environment while fostering more productive achievement of goals (Earley & Peterson, 2004), boosting the functioning of the system and ecosystem. Conversations have been shown to be the way we coordinate cooperative work, the way we work through difficult or complex issues, and the way we make sense of a chaotic information space. Furthermore, designing for conversations is a way in which teams of diverse individuals can communicate effectively by building common ground (Clark & Brennan, 1991; Buchanan, 2019; Ciliotta Chehade, 2020; Keating & Jarvenpaa, 2016) and shared understanding.

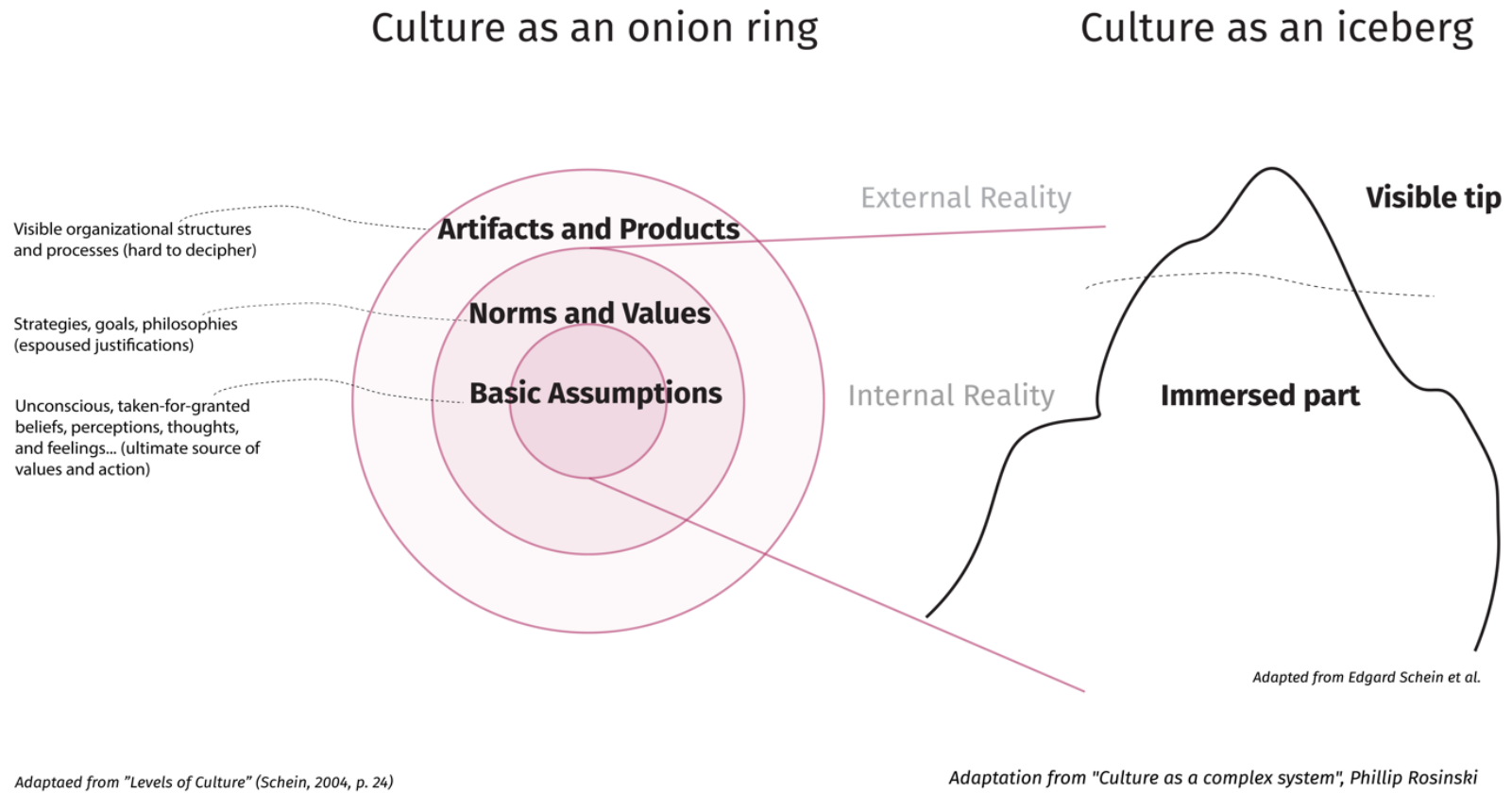


Figure 1. Multi-layered levels of Culture. Adaptations from Rosinski, 2003 and Schein, 2004.

Towards a model of requisite variety through intercultural conversations

A useful model of diversity and conversation as contributing to the interaction of system and ecosystem, or in the case of this paper, team and environment, can be drawn from the work of Ross Ashby (1956) and the requisite variety (RV) model. While a complete accounting of the model is not possible within the scope of this paper, included here are the principal aspects pertaining to our argument. Ashby details several interrelated aspects of variety that are relevant to the challenge of working with diverse collaborative teams. A simplified example can be found in the mechanism of a ship's rudder and its controlling wheel. The rudder can assume 50 different positions. To completely control the rudder, the wheel in the ship's control room must effectively differentiate between a number of positions, an RV, corresponding to the rudder. In effect, the controller contains a model representing the RV of the rudder.

As is the case with many cybernetics models, this model can describe systems that contain varying degrees of complexity. Here, the controller system is analogous to a design team. The varied space of a problem the design team engages with is the rudder. Yet, in this situation, adequately modelling the variety of the problem space within the design team is a much less straightforward task than our 50-position rudder example. With collaborative teams, the problem space is more nuanced, and the borders, rather than being circumscribed into 50 possible positions, are both fuzzy and situated. Fuzzy problem space refers to the difficulty of defining it "because of the ambiguity and chaotic nature that characterise(s) it" (Sanders & Stappers, 2008, p. 7). Problem space is situated in the sense that the members of the design team are each located in their own perspective, with inherently limited knowledge and purview (Haraway, 1988) and, as Jaco Quist (2007) stated in his description of unstructured problems, they "involve various perceptions on the problem" p. 47). So, with these complicating factors, we understand the problem space separate from the rest of the world most indistinctly and arbitrarily, and the knowledge of the team that addresses it as non-objective, coming from multiple vantage points.

On the design project team, fully utilised, these multiple viewpoints (Young, 2020) are particularly powerful, as rather than developing a singular viewpoint of the design problem, the various perceptions of the problem can serve to expand the domain of the problem space, offering a richness and variety of perspectives to the definition of the space that is lost from more singular viewpoints. In relation to the problem space, diverse designers can bring a different way of design thinking, doing, and saying (Kimbell, 2012) when approaching design problems. A diverse team of designers means a greater number of perspectives can see the problem, and a greater variety of approaches can be brought to bear.

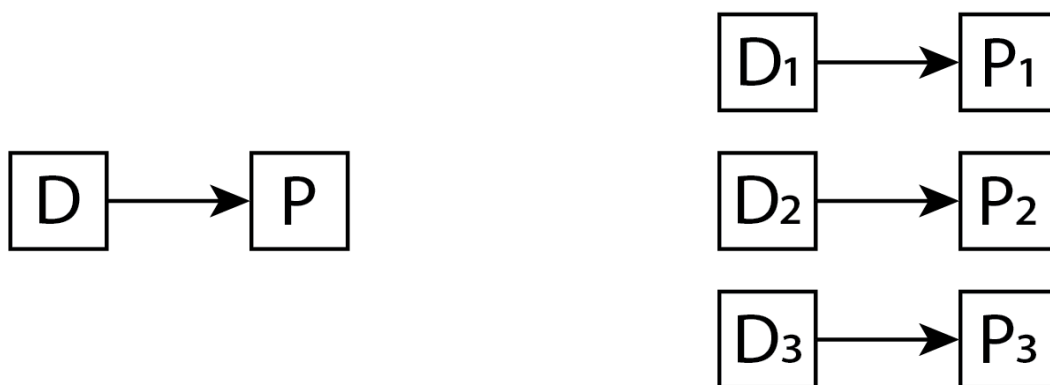


Figure 2. Singular versus a variety of approaches to design thinking, doing, saying.

Yet critical in bringing these perspectives together is the communication fostered between the designers. In the above diagram (Figure 2), the designer's perspectives and background knowledge and their individual approaches to the problem exist, but poor team communication may prevent some perspectives from being surfaced in the team conversation. For example, if D_3 dominates all the design discussions, the team runs the risk of creating approaches where the only aspects of the problem addressed are within the P_3 structure. We argue that the design problem can be seen from a cultural perspective in a fundamentally different way. These diverse perspectives are a key factor in expanding the variety of the "controller".

While RV is an effective metaphor for the interaction between a design team and a problem space, it may be questioned to what degree Ashby intended RV to extend past controller/system complexes. Bartel-Radic and Lesca (2009) discuss the framing of RV as a law of social systems, asserting that “In social sciences such essential, irrefutable conditions do not exist.” (p 7). In a review of systems thinking in management, Mingers and White (2010) discuss Stafford Beer’s extension of RV into the management space: “Beer (1979) was concerned with the complexity inherent in organisations as they are affected by the environment they are in, creating the possibility of great uncertainty. The activities and management of organisations should be such that identifies the minimum number of choices needed to resolve uncertainty.” However, a design team does not need to be concerned with the control of a system or with resolving uncertainty in the same sense. Rather than control or resolutions, the design team is concerned with accessing a broad cultural base—variety—to generate a correspondingly broad range of creative approaches more effectively to problems in that environment. The RV of our design team does not imply design’s control of the solution space, but it instead offers a greater awareness of the complexity inherent and a more flexible engagement of multiple stakeholders’ perspectives. Furthermore, this awareness surfaced within that space in a dialogical way (Laouris et al., 2008).

Providing the means for effective communication, then, becomes imperative for successful interaction in diverse design teams. Diversity of perspectives means that each team member holds different models of the problem space and holds different perspectives on which design approaches may be fruitful. Thus, we hope to encourage supporting individuals to be aware of and recognise their own models and approaches and provide the space for a more welcoming environment where such conversations can flourish. However, intercultural conversations may increase the complexity of effective communication due to people’s different backgrounds and mental models, though Bartel-Radic and Lesca (2009) suggest designing and developing strategies to allow team members to communicate more effectively at different levels—between each other and with their leaders. They urge leaders to find mechanisms to promote conversations among intercultural teams, arguing that the variety of the team alone will not be the answer to complex social systems as intercultural teams are. Organisations need to find ways to manage the complexity that may arise from intercultural dynamics

through conversations and communication mechanisms, not just any communication, but rather open communication and spaces for dialogue (Laouris et al.,2008) that can foster that complexity, provide mutual understanding, and make people feel welcomed and safe allowing this many perspectives to arise. This diversity of perspectives can add to the variety of potential design solutions. But the question is, how might we create more effective collaborations while allowing a diversity of models and approaches to arise? Can we, in our contemporary workplaces, provide these communication channels for improving alignment and common ground building?

Reframing mental models for effective collaboration: case studies for designing for intercultural conversations

In designing for conversations to enhance cross-cultural interactions, we argue that objects can be used as a medium to trigger associations with past cultural experiences, bringing to light thoughts, mental models (Forrester, 1971; Dubberly, 2009), and feelings associated with those objects. Acknowledging that there are different mental models to make sense of the world is key for navigating intercultural conversations and cross-cultural collaboration (see Figure 3). Therefore, to have success in intercultural conversations, we need environments for co-working that better understand, communicate, and respect the integrity of these diverse mental models. To do so is a problem of effective communication and hearing between team members. To communicate effectively, we need openness and awareness to acknowledge old paradigms and views and the flexibility to embrace and reframe them to be more open, malleable, and accepting of new views and perspectives, allowing us to reconfigure our own mental models (Dorst, 2014). In this reframing, different mental models, or parts of others' mental models, can converge with ours in order to create more open perspectives (Figure 3).

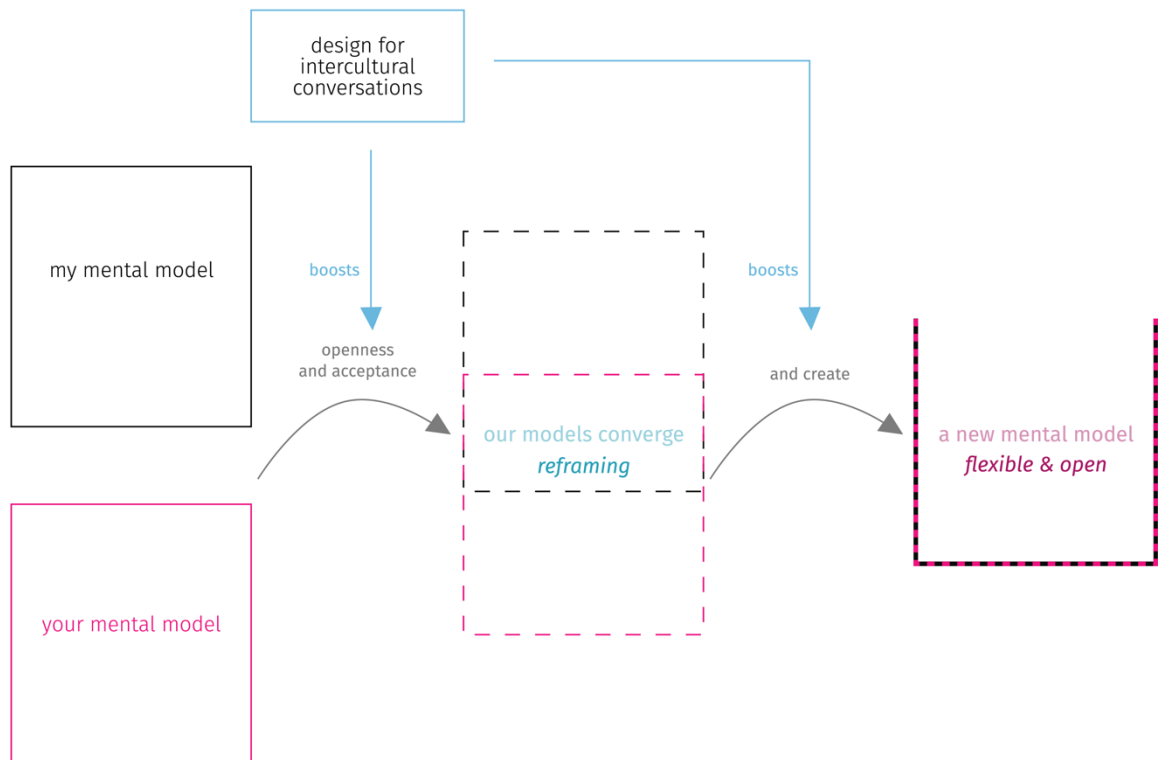


Figure 3. A model for designing for intercultural conversations for flexible and open mental models to emerge.

Redesigning workplaces for intercultural conversations may open infinite paths for diverse teams to take action if people leverage the opportunities to share, understand, learn, reframe, collaborate, and act. Dubberly and Pangaro see the role of designers as enhancers of conversations; they refer to “design for conversation” as “conversations for action” (Dubberly & Pangaro, 2015). These conversations offer an opportunity for participants to create common trustful memories of acting together in a positive and collaborative way that can act as a basis for positive future interactions (Arnold Mages, 2019).



Figure 4. Shapes and objects as drivers of intercultural conversations used in our workshops.

With the previous concepts in mind, we designed and prototyped a workshop embedding the intercultural conversations approach and common ground-building techniques through objects. The workshop was tested in three different settings—with graduate design students (n=7), in a company’s customer experience team (n=7), and at a conference with expert designers (n=15). Each iteration incorporated feedback and learnings from the previous iterations. During the workshop, participants were asked to interact with the designed objects (Figures 4 & 5) and share their memories and associations. In two workshops—one for graduate design students and one for the customer experience team—some participants were acquainted with their co-participants. For many, however, it was their first time interacting. In the workshop with expert designers, we did not collect information about their previous association

with the other participants. Most interestingly, though, was that in cases where participants knew each other—in the co-worker group—participants reported that they had never talked to their peers in such deep and meaningful ways. Participants reported that the workshop provided a space where they were learning about each other's backgrounds in a way they would not have in typical workplace contexts. Comments like: “would love to have more training like this one to get to know teammates on a more personal level” (PX) and the fact that two more people agreed with this comment and engaged further with the conversation support the point above.

The workshop had six stages:

1. icebreaking through cultural objects
2. openness: reflecting on the objects
3. openness, empathy and awareness: group conversation
4. awareness: visualising cultural similarities and differences
5. common ground-building and discussion
6. reflection

Followed by prompts to spark conversations, participants shared diverse cultural backgrounds and experiences associated with the objects, bringing to light thoughts, feelings, emotions, perspectives, and mental models that they otherwise would not have shared. Participants reported being more aware of how one particular object had different associations and meanings to other people and how, at the same time, they were able to find commonalities through the conversations, for example, by choosing an object for the same reason someone else did.



Figure 5. Systems for innovation: workshops with designed cultural objects.

The evocative objects (Turkle, 2007) were designed by one of the authors. (Ciliotta Chehade, 2020) Inspiration came from a preliminary research project, where Ciliotta collected objects through a structured process to learn about people's understanding of what "culture" means, cultural probes (Gaver, Dunne, Pacenti, 1999; Boehner, Gaver, Boucher, 2013), as well as interviews with management experts working with cross-cultural teams. Objects were further refined through user testing, participatory design, and experience prototypes. In this preliminary project, answers to a particular cultural probe question—"Please send me a picture of an object that relates to your culture. And please tell me why you chose it"—led us to collect a vast number of pictures of objects, places, food, people, religion, and nature, among others. These pictures provided insights on the associations that people hold towards "culture" and allowed us to gauge participants' thoughts and feelings connected to those pictures, or as Turkle describes, our "inseparability of thoughts and feelings in our relationship to things (Turkle, 2007, p. 5). The pictures, then, were our source of inspiration for evocative objects in shapes and forms that reflected the images participants shared in the probes.

The workshop was an effective design intervention to support openness, intercultural awareness, and communication, setting the ground for trust and collaboration to emerge. We found that the objects functioned to "set the stage" of the discursive space. (Tharp, Tharp, 2018). Entering a workshop with a variety of abstract objects on the table signified to participants that this was "something else" than a typical workshop. As identified by Tharp & Tharp, we found that

...objects can become more familiar—even if new and somewhat strange—when the audience interacts with them. Tangibility and interact-ability are perhaps the most unique qualities of artefacts as a discursive medium; rather than merely being visualised, they can also connect even more profoundly with their audience. (p 229)

As participants told stories from their upbringing that detailed how the abstract shapes were relevant to them, these objects became a new discursive medium for embracing different perspectives and common ground building. This openness was highlighted in a

participant's comment: "I loved learning about some differences in our stories and wanted to explore more" (PX). Moreover, participants reported a heightened awareness of the importance of incorporating others' points of view and perspectives in the conversation. The results from the workshops suggest that common ground in intercultural conversations can indeed be developed through evocative objects (Figure 6). These objects support conversations that revolve around personal and cultural stories related to participants' backgrounds. These stories, in the context of this workshop, create an environment where openness, awareness, and vulnerability surround the conversation and set the base for trust and collaboration to begin to emerge.

Designing workshops, as well as designing co-working environments, involves designing flexible environments that people can experience in a more personal way, creating an environment where a multiplicity of perspectives can be brought to bear. Moreover, designing for intercultural experiences also has implications for the workplace setting. Reflections on how the varied perspectives on objects parallel varied perspectives on more complex matters is a key moment of growth for the team members. Assuming a systemic perspective, we attempt to provide a model (Figures 6 & 7) to depict how a greater variety of cultural perspectives, communicated effectively, might offer a broader palette of design action and more engagement with a problem space. Co-working sessions should be designed to allow team members to be open to the benefits that a variety of intercultural perspectives can bring.

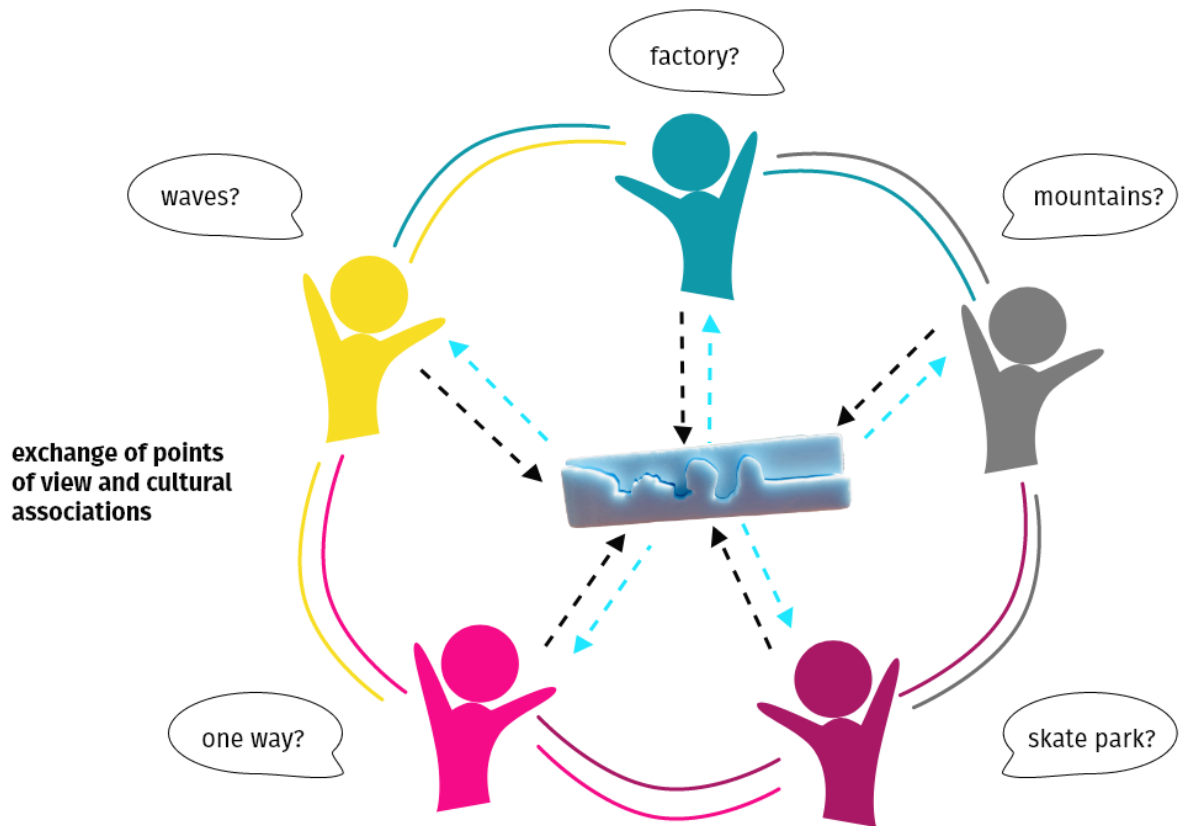


Figure 6. Approaching RV through intercultural conversations: a model representing objects as common ground builders and facilitators of conversations.

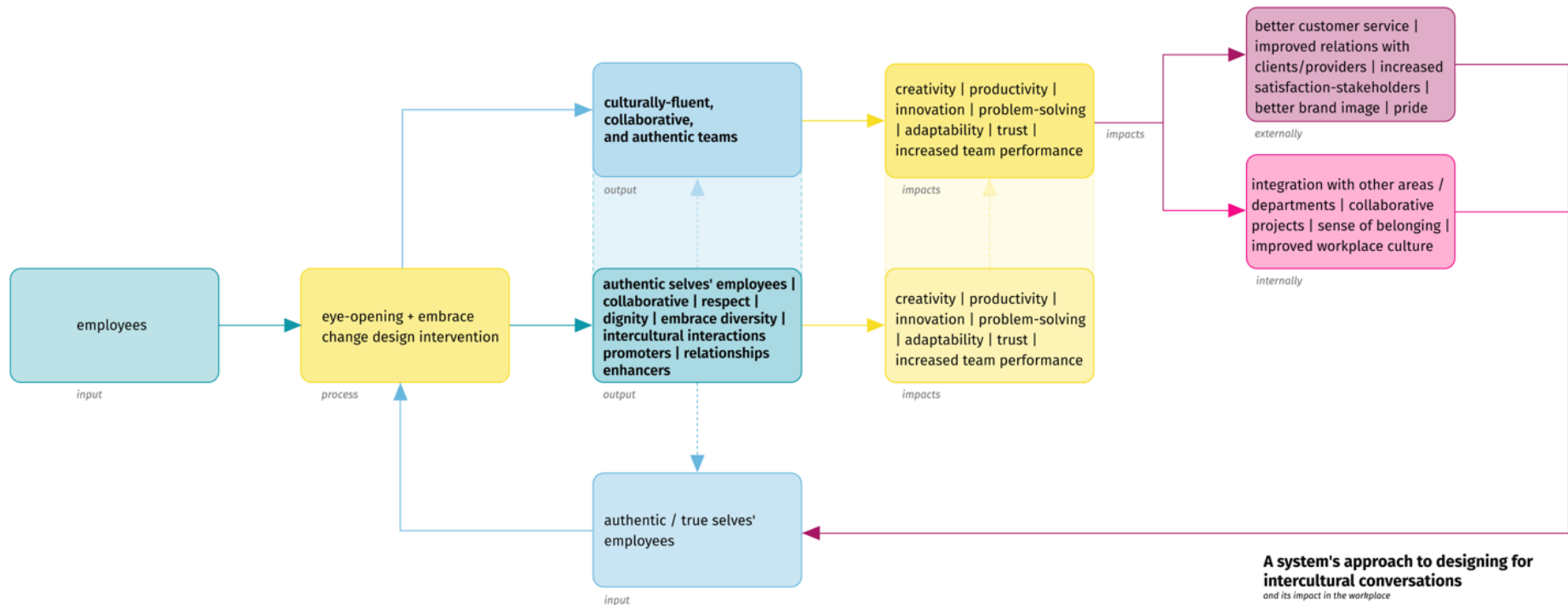


Figure 7. A systems approach model representing the impact of designing for intercultural conversations in the workplace.

Discussion

Some key challenges emerging from this work are highlighted when one begins to translate the bounded workshop experience into the less bounded everyday work practices. A significant challenge for a manager seeking to implement RV within their design teams would be to adequately address team formation. Jones (2014) describes a common approach taken for composing teams for strategically oriented conversations—to attempt “getting the whole system in the room”. This approach seeks to assemble a diverse group of stakeholders on the project team that represents a corresponding set of political interests. Again, we note the subtle difference between assembling an effective design team versus other kinds of working groups or having an appropriately diverse group of stakeholders to discuss a community issue. In a design context, team members must be able to assume the viewpoint of the community of users of a design, as well as work collaboratively with their team members and other professionals to effectively execute a design approach. Where RV is slightly misaligned in this context is that the context of creative production is not quite the same as the context of control.

Another challenge that accompanies team formation is enhancing team cohesion and communication in a way that fosters variety and common ground building. As described in the previous section, the workshop experience suggests an approach that can boost interactions among diverse individuals, enhancing the exploration of different perspectives as well as building common ground. However, to be able to generalise this approach, work needs to be done to further test the designed workshop and explore how the evocative and discursive objects might be used in broader workplace contexts. In exploring different contexts, we acknowledge that another set of challenges may arise. For example, the more structured nature of the workshop scripts a turn-taking that allows all members to contribute in an egalitarian way. In conversations where some members of the team may tend to dominate or where groupthink (Janis, 1972) may diminish the emergence of a diversity of perspectives, we hypothesise that evocative objects might be successful as facilitative objects even without the workshop framing. The workshop, however, may shed light on potential future interventions in which dominating the conversation is stopped by “forced-turned-taking”. By providing a

set of prompts and facilitating a conversation in which each participant is acknowledged by sharing their backgrounds and cultural connections with the objects and by sparking curiosity to explore commonalities and differences through the playfulness of the objects, the workshop seemed to be an effective way to nudge participants to take turns in sharing their stories and perspectives. Thus, we believe that designing for future intercultural interactions within design teams needs to incorporate some ways of forced turn-taking.

In addition, further future work needs to explore how similar workshops and interventions could help design teams develop their tolerance towards complexity and uncertainty. Our workshop experience did not test the impacts of objects and conversations in developing tolerance. However, intercultural development techniques to foster tolerance towards uncertainty were included in the workshop framework. Indications that the tolerance towards uncertainty that comes when people interact with others from different cultures increased with the awareness of the different mental models that emerged through particular objects. Further, we hypothesise that design teams may provide an especially revelatory setting for this work. Design teams often face uncertainty and incomplete information as a matter of course in their work. These issues, however, are much deeper and will need to be explored more in-depth in the future.

Prior work offers some intriguing opportunities to implement rigour in future work. Workshops conducted by John Warfield (1995) measured the number of ideas created and clarified by a diverse team. Gabriella Goldschmidt's (2014) linkography method of analysis, drawn from the Delft Protocol studies (Cross 1995) details the design moves taken and explores forelinks and backlinks within the context of creative idea generation. Workshops by Lockton et al. (2019), as well as the aforementioned evocative objects of Turkle, and the workshops discussed in this paper point to opportunities for leveraging ambiguity and facilitative qualities of objects.

Conclusion

Ideally, the workshop acts as a microcosm of the design team experience. The workshop provides an opportunity for a group to experience a system that is open to the broadest possible range of inputs (Figure 7). It provides encouragement for participants to share their own models of common elements and demonstrates to participants the diversity of perspectives that may meaningfully apply to simple abstract artefacts. As participants in this workshop attempted to look at objects from multiple perspectives, so do design teams in the real world endeavour to look at a problem space from multiple perspectives. The variety of our individual cultural backgrounds, combined with the common ground of our communications, increases the domain of the team as a controller. This expanded perspective, modelled through the workshop activity, and experienced in the exercises, has the potential to transfer to workplaces. Through the cases of the workshop series, this paper shows how surfacing a variety of mental models with a systemic design approach through objects is both possible and effective in cross-cultural teams. Specifically, evocative objects can help teams open up, share different perspectives, embrace differences, build trust, and collaborate to achieve better results. The results include a general understanding of different interpretations of culture and boosting openness to otherness and intercultural awareness, as well as techniques that support building empathy and common ground in intercultural conversations. Given the results of this preliminary work, we envision that the workshop experience can be embedded as part of the design process as teams begin to work on a new design project. Furthermore, intriguing possibilities exist for embedding portions of this workshop or some stages as icebreakers, especially for newly formed collaborative teams.

As contemporary workplaces continue to diversify, developing a richer understanding of the value that a cross-cultural team can bring offers a path towards a more positive working environment, increased personal pride as well as more fulfilling collaborative work. We hypothesise that the engaged variety of perspectives available from intercultural teams may even offer more effective designs.

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