Technology, Movement, and Play is Hampering and Boosting Interactive Play.

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In this paper, we highlight how including technology, movement or play can boost a design process but with unbalanced amounts can also hamper the process. We provide a set of examples where we miscalculated the amount of technology, movement, or play that was needed in a design activity in such a way that it became counterproductive and for each example mention possible adaptations. Finally, we highlight three existing approaches that can balance the overabundance of technology, movement, and play in design processes: activity-centered design, somaesthetic design, and perspective-changing movement-based design.

CCS Concepts: • **Human-centered computing → Interaction design process and methods**; *Activity centered design.*

Additional Key Words and Phrases: play; movement; technology; balancing; product; and process

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1 INTRODUCTION

One strand of CHI PLAY concerns playful interactions with our moving bodies [4–6]. Typical publications address *products* that stimulate play and movement [4–6], or innovative *processes* that use technology, movement, and play, as part of the design process [12].

In both, an implicit tendency towards promoting the use of "more" technology can be expected, but we also recognize "more is better" perspectives in the elements of movement and play. Regarding the design *process*, we see a natural tendency which suggests using more, technology [20], movement [1, 19], and play [10, 11, 14] This 'more is better' perspective includes introducing new *technological* sensors, actuators, or systems; adding more (intense) *movements* and focus on actions; or triggering a more *playful* mindset. We know of only a few approaches that productively *focus less* on technology, movement, or play in the process. We show this for instance can be done by changing the moment of when to introduce technology, changing perspective, or replacing steps with moments of reflection.

Regarding the *products* of design, CHI PLAY's enthusiasm for incorporating technology, movement, and play may go without saying, but we draw attention to work that addresses the benefits of using less of these. One, to focus less on technology alone (e.g., engaging socially with trained volunteers as part of an interaction [21]). Two, to move in only limited amounts to elicit aimed-for feelings (e.g., feeling confined to a closer space [8]). And three, to consider less play as a viable solution for an interesting experience (e.g., lower intensity fantasy/mimicry-based playground games [18]).

This paper grew from our MeCaMInD consortium's experiences in designing with, and teaching about movement-based design methods. We recognize that more technology, movement, and play will *boost* but can also *hamper* the designer, and elaborate on this through experiences from our own work. This then leads to a reflection on the value of three existing approaches.

2 TECHNOLOGY, MOVEMENT, AND PLAY, BOOSTING AND HAMPERING DESIGN PROCESSES

Technology can boost a design process. In the context of weightlifting, we found that wearable Training Technology Probes (TTPs) that made proprioceptive information of posture and movement visible through wearable lasers, could aid to discover values, goals, and several challenges [16].

Technology may also hamper the design process, as for example in our playground work. We let students around halfway in the process start on intermediate technology-enhanced 'experience prototypes' (see [3]). However, during this step, they tended to simplify not only what they could make at that point, through rushed implementation of simple interactions, also later on they continued to ignore large parts of their previous concepts that had interesting experiential qualities. In contrast, it helps to continue for quite some time without any technology and investigate possible types of play on current playgrounds and fields [2, 18]. Similarly, when we interviewed professionals, several indicated to start from simplified 'non-technology' experiences. For instance, rather than smart sensors, using a marble in a transparent tube to simulate the use of an accelerometer [13]. In workshops with physiotherapists, a too strong focus on technology was often detrimental to a focus on sensations and correction strategies. Physiotherapists could more successfully explore feedback modalities by bringing in non-tech materials that provided different sensations or by showing their own feedback strategies.

Movement can boost a design process. When teaching Physical Education (PE) students we noticed they are used to start more from a movement toolbox rather than a technology toolbox. When comparing design ideas to address similar problems, this seemed to lead to a different range of outcomes, adding value to the process.

Yet, *too much movement can hamper* a design process. Originally we planned to design sensory technologies for Yoga [15] with typical bodystorming sessions for movement-based domains [10], the workshops focused on idea generation through a fast pace, constant movement, prioritizing quantity over quality, and incorporating playful elements for engagement. However, Yoga required a slower pace and deeper engagement with ideas with more focus on quality than quantity. Elsewhere, we focused on including movement throughout the design process for an embodied learning activity, which yielded an interactive rocking stool. Here, the breakthrough came when we changed our perspective to the pedagogical approach of focusing on learning as a social activity. Moving less, we were inspired to nudge users to establish social spaces. [1]

Play can boost a design process. For instance, in workshops aiming to invent playful fitness equipment for KOMPAN, we focused solely on the *play* part as long as possible before considering technology. This resulted in suggestions of playful battle equipment that played with the user providing a mix between a boxing ball and pole tennis.

However, *too much play* can also *hamper* the process. In a workshop to create a 20-minute activity, our facilitators focused on keeping the movement flow high (cf. [14]). This resulted in too much movement and playing around, which caused the participants to lose track of why they were playing in the first place. Instead, more reflective non-play moments or roles could have been beneficial here (cf. [14]). Elsewhere, when applying the TTPs in co-design with children, we noted how the children would playfully come up with their own games quite in line with the desired focus. However, they would also come up with games that were not at all aligned (e.g., using the laser TTP to pretend to be Ironman and playfully chase other children). Here, circus instructors were instrumental to balance between emergent playfulness and instrumental goals of training.

In short, these are illustrative examples showing boosting and hampering parts in the design process.

3 THREE APPROACHES THAT HIGHLIGHT 'LESS IS MORE' THROUGH A CHANGE IN FOCUS

There are various approaches that through a change in focus remove an overemphasis on technology, movement, and play while maintaining a core relation to it: activity-centered design, somaesthetic design, and perspective-changing movement-based design.

One, we might want to focus less on technology while designing technology. In *activity-centered design* one also designs non-digital elements, the physical lived environment, the social environment with roles and characters, being open to take technology away rather than add, which has a strong relation to recent work on embodied core mechanics [9]. For example, when a non-digital big ball was introduced in a workshop, subsequently the designed activity also included balancing on the ball, and new rules emerged [9].

Two, while designing with and for movement, we may want to move and 'do' less and appreciate what experiences arise. This is in line with somaesthetic design, strong concepts such as Somaesthetic appreciation [7], and sensory bodystorming [17]. For instance, in the Yoga workshop participants were offered sensory probes including a bean bag and a bag with marbles, and felt differences in texture, malleability, and weight. This led to an idea of a detachable wearable which could be put around someone's foot to get a pose right [17].

Three, we might want to highlight processes where we step in but also deliberately *out of play* in a more structured manner. This relates to bodystorming methods such as embodied sketching with a carousel of proposing and trying out ideas [10]. For instance, in a workshop to design a new interaction while hanging, a participant suggested through showing a 'collecting the dots game' [10]. Another participant joined and added ideas, others then played the system

[1] This turned into iMoLearn https://www.i3-technologies.com/en/products/accessories/imo-learn/.

or suggested additions based on observations, or affordances of the environment and objects. Then the next person took their turn for a new round investigating a new idea. Similarly, in technology-facilitated bodystorming methods such as ‘performative prototyping' there is the playful 'experiencer' which is accompanied by fellow designers taking a facilitator, puppeteer, and observer role to also focus on first, second, and third person perspectives, foregrounding the actual experience through the body over the used technologies [20].

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