

Existential time and historicity in interaction design

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Abstract: Interaction design is increasingly taking part in privileged history-making activities of our society. These activities require a responsible attitude to temporality, considering multiple courses of time and different ways of being in the world. This research introduces the concept of existential time drawn from the work of Álvaro Vieira Pinto to understand interaction design in the production of existence and its denial. The concept is applied to explain a couple of design fiction projects that strived for the liberation of underdeveloped existences in an educational interaction design studio. The students experimented with handling existential time's fundamental quality — historicity, or the possibility of making history — through several conjunctural artifacts. The reflection on these experiments suggests that increasing students' consciousness of historicity is an effective way of countering the domestication of the future, an imperialist strategy that undermines history-making activities in underdeveloped nations.

Keywords: Speculative design, Interaction design education, Development, Time, Temporality, Historicity, Existentialism, STS.

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1. Introduction

Time is considered a defining factor for interaction design (Mazé, 2007; Smith, 2007; Malouf, 2007; Kolko, 2011; Löwgren, 2002), yet little is known about its history in this field. The history of time is non-linear and uneven, understood as part of each society's cultural development (Souza, 2016; Friedman, 1990). As experienced by humans, time is socially constructed, using the available concepts, measurement devices, and technology in a specific culture. Since each human culture produces its own history, there are also multiple courses of time. The absolute, chronological, and standardized clock time is just one of them, yet one often imposed on other cultures through colonialism, imperialism, globalization, and other international relationships (Nanni, 2017; Rifkin, 2017).

Digital technology is vital for this imposition, and interaction design has responsibility for it. As everyday life becomes increasingly mediated by digital technologies, their rhythms (Lefebvre, 2004) are formalized, structured, or replaced by algorithms that structure everyday life rhythms (a.k.a. *algo-rhythms*) that offer little accountability and local autonomy (Finn, 2019; Pagallo, 2018; Firmino et al., 2018; Miyazaki, 2013). These *algo-rhythms* enforce absolute time over other courses of time as a means to pour modern values like progress, efficiency, and profit-making.

Despite the appearance of universality, these values do have a local origin. They come from developed nations, where modernity and, more recently, neoliberalism were invented and dispatched to the rest of the world — as if they were the only viable modes of collective existence (Berardi, 2017; Harvey, 2007). Interaction design contributes to this dispatch by embedding — and hiding — modern and neoliberal values and modes of existence into digital technology's temporal form (Bidwell et al., 2013; Lindley, 2015; Mazé, 2007).

In the last 15 years, critical and speculative design research has questioned absolute time in interaction design (Mazé, 2019; Nooney & Brain, 2019; Huybrechts et al., 2017; Prado de O.

Martins & Vieira de Oliveira, 2016). This research stream made the case that time can also be designed in relative terms: given a certain present, what are the possible pasts and futures? Looking at alternative futures (Bardzell, 2018; Duggan et al., 2017; Coulton et al., 2016; Tanenbaum et al., 2016; Linehan et al., 2014) or alternatives pasts (Eriksson & Pargman, 2018; Huysbrechts et al., 2017; Coulton & Lindley, 2017) enables realizing alternative presents and alternative designs (Coulton et al., 2016; Dunne & Raby, 2013; Auger, 2013). These alternatives often include deviations from the (apparently) inevitable single-story future shaped by digital technologies envisioned by big tech companies. The deviation expands the design space — the scenarios considered in a design project (Van Amstel & Garde, 2016; Van Amstel et al., 2016) — to every kind of social activity, even the non-commercial. Dystopian what-if scenarios reveal undesirable modern futures that certain publics would oppose to (Dunne & Raby, 2013) and utopian how-might-we scenarios generate desirable local futures that communities may commit (Baumann et al. 2017; DiSalvo, 2014). Each community has different perceptions of time, requiring different ways of representing time, for example, the temporal design of alternative clocks with qualitative scales (Pschetz & Bastian, 2018; Pschetz et al., 2016; Pschetz, 2014).

Emphasis on relative time brought speculative design closer to the politics of technology deliberation pioneered by participatory design (Asaro, 2000; Berg, 1998; Ehn, 1988; Bødker, 1987), generating hybrid approaches like adversarial design (Di Salvo, 2015). As modern cultures and societies transition to rely on digital technology for mediating almost any social activity, this deliberation is reaching the level of a politics of everyday life (Escobar, 2020; Manzini, 2019; Greenfield, 2017; Lefebvre, 2014). The transition also implies a shift in the interaction designer's role, from a reflective practitioner (Schön, 1983) to a deliberative practitioner (Foster, 1999). Instead of dealing mainly with the world of design materials and design situations (Löwgren & Stolterman, 2004), the deliberative interaction designer needs to deal with pluriversal worlds, including the conflicts harbored from one world's imposition to another (Escobar, 2018). For example, the world of big tech Silicon Valley raises existential threats to historically oppressed social groups who live in entirely different worlds (Benjamin, 2019; Noble, 2018; Eubanks, 2018; Foer, 2017; Greenfield, 2017). Instead of criticizing big tech structures of privilege and oppression, speculative and critical design remained somewhat detached from these undesirable presents (Tonkinwise, 2014a; Prado de O. Martins, 2014).

The deliberative practitioner is not yet a reality in interaction design perhaps because this field has not considered seriously the collective implications of making history by designing time (Lindley, 2015). Historicity, or the collective human capacity to make history (Vieira Pinto, 1960a, 1960b; Heidegger, 1996), is a recent concern for design research and education (Göransdotter, 2020; Escobar, 2018; Otto, 2015; Tonkinwise, 2014b; Teal, 2011). Transitional design histories, for example, use the concept to justify the inclusion of people traditionally left out from history-making to design together "many possible trajectories, through multiple presents, towards divergent potential futures" (Göransdotter, 2020, p. 306). Except for this new approach, historicity remains mostly unexplored as a foundational concept theorizing Human-Computer Interaction (HCI).

Historicity may not be a widespread notion in interaction design because time has primarily been understood in HCI as a resource or a contextual contingency instead of an existential issue (Hartson 1992; Dourish, 2001; Brandenburg & Hartson, 1999; Buzzo, 2017).

Nevertheless, it is precisely the possibility of developing alternative collective existential projects — such as nations, cities, and creative communities — that animates the political deliberation about everyday life (Manzini, 2019; Escobar, 2018; Spinosa et al., 2007). The relationship between time and existence is especially relevant in territories where settler colonialism cut short the production of local futures to keep the colony tied to the never-reached future promised by the metropolis (Prado de O. Martins & Vieira de Oliveira, 2016; Prado de O. Martins & Vieira de Oliveira, 2016; Stern, 1996). A contemporary example is the discourse on smart cities that pushes underdeveloped cities to develop in the same way as developed cities have developed in the past.

HCI could criticize and counter the existential threats posed by colonialist and imperialist technologies; however, that requires developing further the existential perspective of HCI summarized by Kaptelinin (2016). This perspective currently considers the effects of digital technology on human experience, mainly on dealing with existential questions such as "who am I now?" and "who do I want to become in the future?". Instead of foreclosing the individual inside a "bovine design" that offers little choice and consequential awareness (Light et al., 2017), existentialist HCI encourages responsibility (Kaptelinin, 2018). With proper awareness, the individual can then understand the constraints of a situation and act authentically. As far as it raised the possibility of designers and users breaking free from everyday alienation, this existential perspective does not consider the social roots of the condition. Furthermore, it does not avail the role of history in the production of existence. The lack of historicity lends too much attention to the impact of technology and little on society's impact on existence. To overcome this lack, we think it is necessary to consider the development of technology and society in a dialectical relationship, like the field of Science and Technology Studies (STS) typically does (Kira & Merkle, 2016).

With the goal of developing a dialectical-existential perspective over time in interaction design, this research examines the work of Brazilian philosopher Álvaro Vieira Pinto¹, who can be considered a forerunner of STS (Merkle & Queluz, 2010) and decolonial studies (Costa & Martins, 2019). His work focused on the relationship between consciousness and nation, how it manifests in philosophy, education, work, demography, science, technology, development, and cybernetics². He was primarily concerned with underdeveloped nations like Brazil that, between the 1950s and the 1960s, went through rapid modernization,

¹ Vieira Pinto (1909-1987) graduated in Medicine in 1932 and worked as a researcher for 16 years in a biology laboratory at the Gaffré and Guinle Foundation of Rio de Janeiro, RJ, Brazil. There he conducted extensive research on the effect of X-rays in the treatment of patients. To support this, he followed Math and Physics courses. Later on, in the 1940s, he worked as a writer of scientific dissemination publications. At the end of the decade, he studied philosophy for a year in Sorbonne, France (1949). Before that, he was a professor of Philosophy of Science (193?-1939) at the Universidade do Distrito Federal (UDF) and professor of Logic and History of Philosophy (1939-?) at the Universidade do Brasil (now UFRJ). After the war, he became head of the Philosophy department (1955-1961) at the Instituto Superior de Estudos Brasileiros (ISEB), of which he later served as executive director (1961-1964). He stepped down from ISEB and sought exile in Yugoslavia for a year (1964-1965), being assisted by Paulo Freire to move back to Latin America, in Chile (1965-1968), where he worked at Latin American Center for Demography (CELADE). He managed to return to Brazil (1968-), despite being restricted from giving classes and lectures. He spent the rest of his life working at home, writing book manuscripts, and acting as a translator (under pseudonyms) of scientific works in different languages and areas of knowledge (Côrtes, 2003; Fáveri, 2014; Gonzatto & Merkle, 2017).

² The Álvaro Vieira Pinto Studies Network maintains a list of the author's known works, including missing and unpublished manuscripts. Available at: <<http://www.alvarovieirapinto.org>>.

industrialization, and urbanization transformations. Although his ideas (like consciousness and underdevelopment) have profoundly influenced many intellectuals of his time, such as Paulo Freire (1970), his work is not yet widely known, even among the experts of his topics. This unawareness can be explained by the fact that the military dictatorship that took over Brazil in 1964 forced Vieira Pinto into exile at that same year, discouraged the publication of his works, and prevented him from joining any public debates when he returned to Brazil in 1968. Working quietly at home with some help from his wife, he wrote several manuscripts until his death in 1987 (Gonzatto & Merkle, 2017). Some of these manuscripts were found and published after the 2000s (Vieira Pinto, 2005a; 2005b; 2008), sparking a renewed interest in his work. Among them, *The Concept of Technology* ([1973]2005) stands out: a dialectical-existential treatise on technology divided into four thick volumes that predated many discussions held in HCI since the 1980s, such as handiness, information theory, division of labor, mediated activity, futurology, and human cognition, as well as discussions held in the STS field since the 1990s, such as technological determinism, technical reason, technology as culture, scientific development, dependence theory, and technological inequality.

In previous works, we explored the possible contributions of Paulo Freire to interaction design education (Van Amstel & Gonzatto, 2020; Gonzatto & Van Amstel, 2017). In the present research, we turn to Álvaro Vieira Pinto, considered to be one of his masters (Fáveri, 2014; Romão, 2019, p. 517), to deal with third-wave HCI education issues. If education in the first wave focused on learning on how to design efficient interactions for work routines (Hewett et al., 1992), in the second wave, issues of workflow and coordination came to the fore (Blevins et al., 2014; Blevins et al., 2015; Culén et al., 2014; Thomassen & Ozcan, 2010). In the third wave, when HCI becomes concerned with the political deliberation of everyday life (Kira, 2016; Churchill et al., 2016; Merkle & Amaral, 2013), HCI education moved towards broader contexts in which the very existence of diverse human social groups is disputed or threatened (Bordin Rodrigues, 2019). HCI research has responded to these threats by reconstructing its philosophical foundations based on postcolonial theory (Irani et al., 2010; Bidwell et al., 2013), feminist theory (Prado de O. Martins, 2014; Bardzell, 2010; Star, 2000), queer theory (Light, 2011), posthumanism (Forlano, 2017), race studies (Lindtner et al., 2018), and other approaches that try to avoid the pitfall of implicitly reproducing oppression in HCI theories.

While observing these movements in third-wave HCI, we developed a design research program (Redström, 2017) informed by Vieira Pinto, Paulo Freire, and other Latin-american authors on the possibility of designing for liberation (Van Amstel & Gonzatto, 2016). This research reports on two series of design experiments (Brandt & Binder 2007) held as part of this program with interaction design students in a Brazilian university. We chose the educational context for these experiments because it is an opportunity to observe and intervene with interaction design professionals' emergence, particularly the development of their ethical and aesthetic foundations. The educational challenge of learning design artifacts and methods or developing digital competence sometimes overshadows the profession's ethical and political dimension (Bordin Rodrigues, 2019; Gray, 2014; Artman & Arvola, 2008). As we have pointed in previous studies (Van Amstel & Gonzatto, 2020; Gonzatto & Van Amstel, 2017), this avoidance can be explained by the banking concept of

education³ that deposits content (like artifacts and methods) in the student (designer) heads, who may or may not use it in the future (Freire, 1970; Bordin Rodrigues, 2019). The design experiments raised critical consciousness among the students on the relevance of interaction design to their locality, first and foremost, to avoid the domestication of the future that prevents local development (Vieira Pinto, 2005b). We tried to take hold of historicity in our socio-economic-political-cultural context of underdevelopment (Vieira Pinto, 1960b; 1973), an interest that brought us to the concept of existential time.

Existential time corresponds roughly to the social construction of time from historicity (Vieira Pinto, 1973). This temporality is both subjective and objective because it shapes experiences and material conditions for the production of existence. As such, it does not unfold as a straightforward course of action but as an existential challenge that involves choices, decisions, ethical dilemmas, contradictions, and politics as much as building, making, transforming, and doing. Instead of pointing to an imponderable property of the world (like absolute time) or to the subjective experience of thrownness in the world (like relative time), existential time points to the social dispute for being fully human and making history through acting in the world in a concerted manner. Since technology is both a condition and result of human action (Vieira Pinto, 2005a; 2005b), its relation to existential time is not restricted to measurement, understanding, and use, but to development in the first place. The development (and underdevelopment) of collective existential projects like the nation lies at the crux of existential time.

Development is a widespread notion in HCI, largely related to the possible large-scale effect of introducing digital technologies in underdeveloped nations, as if their existential projects could accelerate or leapfrog to the same material conditions offered by developed nations (Wyche et al., 2012; Ho et al., 2009; Anokwa et al. 2009; Kleine & Unwin, 2009). Critics have pointed out that not every nation wants to develop in the same way as developed nations even if there is a dependence from them, recognizing many cultural development streams (Escobar, 2011; 2018; Irani et al., 2010). Underdevelopment in this critical view ceases to be a problem for the developed to solve, but an opportunity for the underdeveloped to make history in a different stream. Existential time and historicity seems to be key concepts to understand and practice the deliberative role of interaction design in the condition of underdevelopment.

This research relates existential time and historicity throughout nine sections, including this introduction. In section 2, we delve into the main concepts behind Álvaro Vieira Pinto's existential time: the production of existence and historicity. Historicity leads to a discussion of handiness and the distinction between Vieira Pinto's and Martin Heidegger's understanding of these terms. Section 3 expands further on handiness and relates the concept to development and underdevelopment. In section 4, there is a description of a specific strategy that affects existential time in underdeveloped nations, the domestication of the future. In section 5, we summarize two series of experiments that tried to counter the

³ Freire (1970) wrote explicitly about *banking education* as historical oppression that affects many educational models in colonized territories. Alternatively, he also spoke about the *banking concept of education*, which we prefer here to define the oppression relation. We expect to avoid the literal while preserving the metaphorical relation to banks and their economic notion of humanity, the *homo economicus*.

domestication of the future in an educational interaction design studio in Brazil, including its major outcome: a range of conjunctural artifacts developed to handle existential time. Sections 6 and 7 describe and analyze two design fiction projects developed by the students within the experiments. Section 8 discusses the insights and limitations of these experiments and the possible contributions of realizing existential time. Finally, Section 9 presents final remarks on the research, in which we summarize our findings and point towards (localized) future studies.

2. Existential time in Álvaro Vieira Pinto

This section introduces key concepts developed by the Brazilian philosopher Álvaro Vieira Pinto⁴. His ontology (Vieira Pinto, 1960a; 1960b) positions the human being as a temporal being, which relates to the world in a temporal way, similar to what Martin Heidegger did in his book *Being and Time* (1996). Instead of defining the essence of being like the German philosopher defined the *Dasein* entity, the Brazilian philosopher states that human beings produce their existence by transforming reality. Humans are distinguished from other beings precisely because they produce their existence socially and historically from material conditions. Each society and individual must produce their existence based on the interactions with what is available around, what he called handiness⁵. From that handiness, human beings can design new possible actions, develop, and produce new means of existence.

Though not by this name, handiness often appears in HCI discourse (Dourish, 2004; Savanaes, 2000; Ehn, 1998; Bødker, 1987; Winograd & Flores, 1987) based on the Heideggerian distinction between the two modes of interacting with objects in the world (Heidegger, 1996, p. 65): 1) *ready-to-hand* (*Zuhandenheit*) or practical attitude: when the interaction takes place in everyday life as if the human and the object were a single being; 2) *present-at-hand* (*Vorhandenheit*) or theoretical attitude: when an object is understood as an external entity and distinct from the person. In this interpretation, the shift between handiness modes occurs through breakdown, repairing, and learning. For example, when an object breaks or does not work as expected, it requires going from *ready-to-hand* to *present-at-hand*. The opposite is also true: when repairing a broken object, its relationship shifts from *present-at-hand* back to *ready-to-hand*.

Álvaro Vieira Pinto (1960a; 1969) engages in a critical reading of Heidegger's understanding of handiness. First, he situates handiness in specific historicity. Advanced technologies are *ready-to-hand* for some people because society has made them so (Gonzatto, 2014). Conversely, less advanced technologies are *present-at-hand* or not even available to others.

4 Vieira Pinto's conceptual framework is based on various theoretical references. For the concepts we use in this paper, it is worth highlighting the influence of European existentialism, 1st and 2nd wave cybernetics, Marxism, and Hegelian dialectics, post-colonialism, and latin-american developmentalism (Côtés, 2003; Fáveri, 2014; Kleba, 2006).

5 Vieira Pinto's concept of handiness (*amanualidade*) is similar to HCI concepts (Gonzatto, 2014) such as readiness-to-hand (Winograd & Flores, 1987), situated action (Suchman, 1987), embodied interaction (Dourish, 2004a), and context (Dourish, 2004b). Due to his Marxist background, he emphasizes the role of work and consciousness in transforming handiness, which brings his thesis even closer to activity theoretical views on HCI (Nardi, 1996; Bødker, 1987). Handiness is not a synonym of activity or context, as it extends from the individual hand to the collective nation, including any mediation implicated in action (Gonzatto & Merkle, 2016).

Second, he proposes a third and foundational mode of handiness: work, the mode of engagement with reality that transforms handiness, creating new possibilities. The modes of engagement are not static and alternating like in Heidegger's interpretation. According to Vieira Pinto, these modes are simultaneously developing in higher or lower handiness degrees (Gonzatto & Merkle, 2016; Vieira Pinto, 1969). He provides an example: "the primitive man, after having invented the bow and arrow, could not, of course, send any artificial satellites into space, but he could then hunt animals that were out of reach" (Vieira Pinto, 1969, p. 532). Handiness degrees admit that human relationships with reality can always develop through continuous work. Because everything in handiness is the result of previous work, it can also serve as a material for future work (Vieira Pinto, 1969, pp. 122-123; Vieira Pinto, 1960a, pp. 68-69). The first hammer, for instance, was not crafted by other hammers. The human creator had to use artifacts and knowledge from the existing handiness. As soon as the hammer became *ready-to-hand* through this historical work of developing handiness, the construction of a range of new artifacts became possible, but not for every social group. If a higher and lower handiness degree exists in history, it is because there is an uneven distribution of techniques in society (Gonzatto & Merkle, 2016). With this concept, Vieira Pinto does not intend to create a universal scale of handiness but to reveal the historicity of technique.

Vieira Pinto's concept of historicity also differs from Heidegger's⁶. The German philosopher considers that historicity is an essential condition for being (Heidegger, 1996, p. 430); hence humans are not born in (natural) history; they are historical because everything they do has history and produces history. Nevertheless, Heidegger recognizes the predominance of an inauthentic notion of historicity in everyday life (which is similar to what we discussed previously about absolute time) and propose an authentic understanding of historicity that takes time as a property of human beings and not of inanimate things like clocks (Heidegger, 1996, p. 358). Based on this, authors in the design field refer to this time as *existential time*, a subjective way of experiencing time in everyday life (Otto, 2015; Schatzki, 2006; Atfield, 2000, p. 217; Knapp, 1986). Vieira Pinto's understanding of historicity does not support this subjective interpretation of time. The Brazilian philosopher agrees with Heidegger that historicity is essential to human beings; however, he emphasizes that consciousness of historicity is socially produced (Vieira Pinto, 1960b, p. 533). In fact, historicity is a relationship between human beings and the consciousness generated from several people interacting with the world. This understanding of historicity leads to a completely different notion of existential time:

Humans are, in fact, by essence, beings endowed with the ability to last, and if this duration, appreciated from the outside, manifests itself as a chronologically limited period between two dates, if birth and death have a specific and definite day, the real duration in which human life passes is something unintelligible quantitatively, one that presents itself as a form of perception of an existence by itself, in the consciousness of its identity with itself, which is constituted by the unity of its diverse and successive aspects and states. Humans perceive the succession from self to self from within, as an evident fact of their consciousness. Humans know their existence

⁶ Heidegger's usage of the German word *geschichte* in *Being and Time* is translated to English either as *historicity* (Heidegger, 1996) or as *historicality* (Heidegger, 1962). We chose to stick to the recent translation to ease the dialogue with Vieira Pinto's (1960b) translation of the term in Portuguese: *historicidade*.

as the history of themselves, of which, moreover, they are the only historians (Vieira Pinto, 1973, p. 377).

History is, for Vieira Pinto, the trace left by the transformation of reality that human beings shape and are shaped by. As for work, it is the conscious effort of using these traces to produce the means of existence. The more conscious and participative human beings are to the historicity that constitutes them — or that may constitute them in the future, the greater the human being's capacity to produce existence. Existence, for its sake, is not entirely subjective as it depends on the material accumulation of work in collective existential projects, such as the biological and cultural evolution of the human species. Agreeably, the time of this existence should also be partially objective:

Existential time is the one in which man really exists; it is the duration that is confused with his existence, where the origins of his decisions are located, where the acts sprouts from freedom, [...] because they are relative to the production of existence, not of the individual, but of the species (Vieira Pinto, 1973, p. 376).

From that definition, we can imply that existential time corresponds to the social production of time within the possibilities offered by a specific social group's historicity and handiness. Humans produce existential time to organize the collective existential projects they are part of, but this production can also deny the existential projects of other social groups — this being the negative aspect of existential time. In existential time, past, present, and future becomes temporalities of existence, as possibilities and not as determinations: "consciousness captures itself in its enduring reality and sees itself as a being that identifies with what has already been, as well as it anticipates in sureness, or the expectation, of what is yet to be" (Vieira Pinto, 1973, p. 377). Linearity cannot encompass this aspect of existence as it can be altered, transformed, and diverted. For Vieira Pinto (1960a; 1960b; 1973), temporality is the result and the condition for the social production of historicity, the union between "historical memory" and "will of destiny" (Côrtes, 2003, p. 210). In other words, the present corresponds to the realm of freedom, as it is an open field for changing past and future (Gonzatto et al., 2013). Since it is oriented to change, the present always directs towards the future, even when including the past. The human being seeks to anticipate the reality that does not yet exist, acting in the now with intentionality. Due to this orientation, we could say that human beings do not only develop existential projects; they are existential projects in themselves. Design and HCI theories have tried to capture that aspect of human reality under terms like ontological design (Escobar, 2018; Willis, 2006; Winograd & Flores, 1987), life projects (Manzini, 2019), and community endeavors (Botero, 2013).

Framing human existence as a collective project reinstates the importance of *ecstatic* temporality — the linear succession of past, present, and future — that Heidegger (1996) considered to be vulgar. In existential projects, the present results from the accumulation of previous work, reified as knowledge and techniques — the "legacy of historical experience" (Côrtes, 2003, p. 210). What we now call the past was, in those days, a present. The past offered multiple possibilities, decisions, and paths, as it "was also the future of an older present." (Vieira Pinto, 1960b, p. 32). The taken path, which we now see as a given past, was just one of the possibilities contained in that existential time. Human beings who are conscious of their historicity can rethink their past existence to open up futures. Transforming material conditions in pasts and presents allows for new forms of action in

futures.

3. Handiness and (under)development

Existential projects do not develop solely by their inner forces. There are always several collaborating and competing existential projects in the same locality, not to mention different localities. Vieira Pinto (1960a, pp. 77-79) explains the development of existential projects through a dialectic of the new and the old. The continuous use of old techniques creates the need and conditions for new techniques that are more effective. This quantitative accumulation of techniques gives rise to a qualitative transformation of handiness, when all the individuals associated with the existential project can handle the new technique. However, when this technique is brought to other existential projects that have not gone through the process of accumulation, it generates the need of the new without the conditions of the old. The technique is then used only by a few social groups. This externally induced development ends up generating dramatic differences in handiness degrees among social groups (Gonzatto & Merkle, 2016).

As can be seen in this dialectics, handiness results from accumulated knowledge and technologies and objects arranged in a specific conjuncture together with offering a space for immediate action and long-term existential projects (Vieira Pinto, 1960a, pp. 60-69). Vieira Pinto's handiness concept emphasizes that the human being is defined not only by his mind or body but also by his situation and circumstances. Humans become humans by taking the local reality as a material for transforming that same reality (Vieira Pinto, 1960a; 1969; 2005a). Handiness is a local developing relationship, starting from the hand — which is in the body's immediate reach — and extending to the entire nation where the human being is located (Vieira Pinto, 1960a). The nation appears as a crucial mediation due to the role of government, politics, laws, ideologies, and identities in shaping reality. The human organization of the world into several nations is a trace of collective existence in contemporary societies. The relationship between the subject and the world inevitably crosses the nation, as Vieira Pinto writes: "I cannot understand the history of the past and future world unless it affects the course of events in my own national space" (Vieira Pinto, 1960b, p. 30). Like so many other intellectuals from underdeveloped nations in post-war geopolitics, Vieira Pinto claimed their people's sovereignty. The possibility of deciding the direction of these nations and developing their futures required the criticism of imperialism and dependence relations that generated underdevelopment (Côrtes, 2003).

From a dialectical-existential perspective, underdevelopment⁷ is a relative condition. Ontologically, all nations are developing, but, historically, some of them have managed to establish themselves as *developed* in relation to *underdeveloped* nations. Underdevelopment is not the result of some nations' incapacity; it is a condition caused by imperialism, colonialism, political interventions, marginalization, and other dependency

⁷ Underdevelopment is no longer usual in contemporary Geography and Economics; however, we think it is relevant to keep it as Vieira Pinto meant. Influenced by Celso Furtado's (1964) work, Vieira Pinto joined a generation of Brazilian intellectuals who proposed national-developmental ideologies. The Instituto Superior de Estudos Brasileiros (ISEB), which he directed for some years, discussed the proper ideology for national development. This existential project was interrupted by the military coup of 1964, yet influenced critical geography (Santos, [1979]2017) and dependency theory (Dussel & Yanez, 1990).

strategies originating from developed nations' geopolitical strategies. The relationship between the developed and the underdeveloped can be characterized as an oppression (Vieira Pinto, 1960a, pp. 80-81, 181) since it denies the underdeveloped right to humanize through raising consciousness of historicity and increasing handiness degrees.

Developed nations do not want the former colonies to develop any further because in this state of affairs they can continue to perform this exploit through commercial and political exchanges. That is why Vieira Pinto considered terms like *developing nations* as an euphemism. For him, unawareness or rejection of underdevelopment results from ideological work that conceals historicity (Vieira Pinto, 1963). However, Vieira Pinto (1960a) uses the term underdevelopment as a development that was prevented from developing, but that can still develop, especially, in a different way than developed nations. Granted, underdevelopment is a possibility for the underdeveloped to become aware and make history for themselves.

When Vieira Pinto defines underdevelopment as a "way of being of the total existence of a national community at a certain stage in its process" (Vieira Pinto, 1963, p. 257), he defines it as a qualitative condition of a collective existential project. His dialectical-existential perspective comes close to contemporary perspectives, such as that of Arturo Escobar's (2011; 2018; 2020), which recognizes that each culture has its own development parameters: "The first correct axiom of the development theory, inspired in dialectical thinking, states that no country is obliged to follow the same path taken by another country, just because it led that country to the pinnacles of history" (Vieira Pinto, 2015a, p. 302). Both scholars denounce the oppression that impose a single development path to every nation, however, Vieira Pinto does not support a relativistic approach to development. He recognizes that developed technologies may reflect the highest level of reason achieved by the human species in understanding the laws of nature and making good use of them. However, he states that these technologies depend on the accumulated work of these nations and elsewhere. Simply transplanting these technologies to underdeveloped countries does not necessarily contribute to their development, as it does not lead to accumulated work there. To the contrary, developed technologies usually improve the

capacity of the developed to exploit the underdeveloped work. Therefore, "not any 'technology', identified as 'technique', suits [the underdeveloped], even those that represent the most advanced productive development of the moment" (Vieira Pinto, 2005a, p. 257). To Vieira Pinto, the underdeveloped nations' strategy should be to import and adapt what is necessary to develop autonomously and distribute all of their benefits among its constituent social groups (Vieira Pinto, 2005a).

4. The domestication of the future

Self-directed development is discouraged by various symbolic operations and discursive strategies that occlude the developmental relation. Among them, the domestication of the future⁸ stands as a specific form of alienation characterized by the concealment of the open and undefined characteristic of the future temporality (Vieira Pinto, 2005b, pp. 680-695). Domestication of the future is not just a type of media or a form of narrative, but an ideological way of operating with the future dimension (Gonzatto et al., 2013). It is about removing the threatening and unknown nature of the future, domesticating it in advance, in detail (Vieira Pinto, 2005b). Once domesticated, the future may disguise the continuity of the present's oppressive reality.

In everyday life, the domestication of the future takes the shape of an extreme concern with technologies and a lousy disregard for the human interests that drive them (Vieira Pinto, 2005b). The developed nations' charismatic technologies (Ames, 2015) present themselves as if they were already positioned in the future in a precise operation to persuade and convince the underdeveloped nations of their justified dependence. Conversely, the same operation disqualifies the techniques possessed by the underdeveloped as obsolete or delayed. In this value shift, the domestication of the future reinforces the alienated judgment that imported technology is always of better quality.

The domestication of the future detaches technology from handiness, blocking the present reality's examination (Vieira Pinto, 2005a, p. 50). The speculation about the future centers around the revolt of robots, time-traveling paradoxes, or humanity over-reliance on technology. Technology's role in amplifying or reducing oppression relations is mostly absent or presented as a narrative subtext. Colonial views often present technology as the motor of human history, pushing society forward in linear progress that ends with the developed nations' condition (Vieira Pinto, 2005a). The domestication of the future often recourse to an ideological study of the future, the futurology:

It seems fair to say that the eloquent "futurology" euphorically designed by economists and sociologists in imperialism's service constitutes something worse than an error: it is useless. Man, ultimately, is not interested in knowing with which machines they will live with but with which men. In other words: what man expects

⁸ Vieira Pinto (2005b) problematizes the question of the future in different ways, sometimes referring to it as *domesticação do futuro* (domestication of the future). This is not to be confused with media domestication (Berker, 2006), which is used in speculative design to describe the transition of new technologies from wild laboratories to domestic contexts (Auger, 2012).

from the future are not better machines, which give them greater comfort, but better men, forming a fraternal society, without risks, deprivations, anguish, and exploitation (Vieira Pinto, 2005b, p. 693).

Classic futurology typically describes a state of reality that was expected by society, yet refrained from "indicating the means and forces that should transform the present into the enunciated radiant future." (Vieira Pinto, 2005b, p. 91). Contemporary futurology is now clear about framing technology and science as the engines of transformation. Vieira Pinto's understanding of historicity debunks this myth: technology does not make history; humans do (Vieira Pinto, 2005b). Also, the individual does not make history alone. Humans make history by developing collective existential projects, such as that of the nation. To speak of history without the human being is to reify time as a technology of control, hiding the human participation in its definition, production, and measurement.

The domestication of the future neutralizes the present as an opportunity for social change as if it was unnecessary or impossible to change. Its main symbolic operation is to transform hope into waiting — waiting for future technologies from the benevolent developed nations. Unfortunately, when these techniques do arrive, they are part of the past, with the best-before date already expired. To paraphrase the Silicon Valley slogan problematized by Lucy Suchman (2011): "the future arrives sooner here." This operation undervalues the technologies possessed by the underdeveloped nations. In this mismatch, the artifacts from the developed nations appear as the ultimate versions of the artifacts from underdeveloped nations, as if they stemmed from the same existential projects. Constraining history to a given future, the domestication of the future denies the oppressed historicity as if they could not make history from inner forces. Only a hero, an enlightened one, an outsider, an alien, a natural cause, or a *deus ex machina* can change domesticated futures.

Science fiction is a literary genre that often supports the domestication of the future, especially for its potential of alienated entertainment. It is an expensive genre in cinema, which requires cutting-edge technologies for special effects, rarely seen in underdeveloped nations. Technology appears even more futuristic than in their countries of origin because they take the developed handiness as a starting point. In contrast, underdeveloped handiness is restricted to dystopian stories as if they represented undesirable futures.

In speculative design, there is the design fiction genre, which differentiates from science fiction (Bleecker, 2009; Sterling, 2009) in its focus on everyday life and on ordinary people. Despite these differences, design fiction may similarly contribute to the domestication of the future when it introduces near-future scenarios as something unavoidable, particularly to underdeveloped nations. Even if the fiction challenges the status quo, technology is depicted as a dynamic, active entity while society is portrayed as a static passive entity — effectively hiding the historical nexus between technology and society (Kira & Merkle, 2016). Similarly, underdeveloped technology is depicted as static in comparison to the always-changing technology of the developed nations. The domestication of the future obscures the technology producers and their intentions, making their products appear as autonomous agents coming from nowhere (Suchman, 2002), ready to disrupt any society that welcomes them.

Although they speak about a futuristic scenario, design fiction is materialized in the present,

reflecting present values, intentions, and ideologies (Gonzatto et al., 2013). Design scholars concerned with the domestication of the future have tried to counter this strategy in the present by adopting a decolonial perspective over speculative design (Schultz, 2018; Prado de O. Martins & Vieira de Oliveira, 2016; Vieira de Oliveira & Prado de O. Martins, 2016; Vieira de Oliveira, 2016). In their effort, they implicitly raised a challenge for underdeveloped interaction design: how to raise designers' consciousness of oppressed historicity? In the next section, we present design experiments that encourage future designers to handle existential time in the condition of underdevelopment.

5. Handling existential time in underdeveloped interaction design

If handling existential time requires increasing the handiness' degree to the point of becoming fully conscious of historicity, how to develop that in a design experiment? Developing handiness in professional practice is tricky as most designers work in alienated situations, not seeing how their work fits an overall picture, e.g., how it contributes to collective existential projects like the nation. We have chosen to run experiments in education since it offers a unique opportunity to develop history-making skills. Students are still discovering their places in the world and the worlds they want to place themselves. By becoming aware of their historicity, they might realize they are already transforming a specific world and can do that more consciously.

As teachers in the Digital Design bachelor program located in Brazil, we wanted to develop student handiness to handle existential time responsibly in the condition of underdevelopment. In past experiences, we noticed huge differences between developed interaction design and underdeveloped interaction design (Van Amstel et al, 2012). We concluded that it was beneficial for our nation to develop interaction design from our reality, even if underdeveloped. We organized, then, two series of design experiments (Brandt & Binder 2007) guided by the evolving concept of existential time in our designing for liberation research program (Van Amstel & Gonzatto, 2016). We documented these experiments through written annotations, audio recordings, video, and photos, all taken with verbal consent. The qualitative data was later reviewed and analyzed to write this account and reconstitute the historical unfolding of the research program and the evolving understanding of the theoretical background introduced in the previous sections.

We had two series of design experiments: one held in the Hypermedia course and the other held in the Interaction Design Course, both from the same bachelor program. Aiming to expand the design space of interaction design to include technical and social relations connected to values, culture, and politics (Botero, 2013), we chose design fiction (Bleecker, 2009; Sterling, 2009) as the central design practice for both courses.

The first series of experiments was conducted throughout seven cohorts of Hypermedia, between 2011 to 2014, by the second author, who acted as the course's teacher. In the experiments, students speculated about their reality while producing design fiction about their future visions. From the standpoint of interaction design, these visions can be considered fancy solutions to existing problems that simpler technologies could better solve. The requirement of developing the same video project in the Special Effects course, taught by another teacher, may partially explain that. In any case, from a dialectical-existential

perspective, students were trying to mimic the future visions that the second author introduced as examples as well as the ones they found when searching for examples on their own. They watched videos produced by big tech corporations from developed nations, such as Microsoft, Google, Nokia, and Corning. Their fictions aptly mimicked these fictions, looking for new uses for the technologies without questioning or altering their designs. Not surprisingly, several design fictions created by the students applied Augmented Reality (AR) glasses — a technology disputed by some of these companies at that moment — for gamification, chat conversations, image editing, and other activities they often engage in everyday life. They took their present reality and developed further that reality as a possible future, using digital and physical mockups for representing futuristic technologies.

While handling existential time in this way, students crafted a universal future that could happen anywhere on the planet. Qualitative changes in technology and society hardly appeared. The alternative futures of speculative design (Dunne & Raby, 2013), instead of opening up alternative presents, led to realizing the *status quo*'s strength. Students imagined having more developed technologies (a quantitative change) as if that was all that is possible to imagine about the future in an underdeveloped nation. The first series of experiments resulted in ample evidence of the domestication of the future, which we tried to deliberately counter in the second series.

In the second series of experiments, both authors worked as teachers. We consider here seven cohorts of Interaction Design, spread from 2015 to 2018. The course focused on human relations mediated by digital artifacts, with the perspective that interaction designers must work amidst an ecology of interactions (Forlizzi, 2008), playing the role of metadesigners that make interactions visible and designable (Vassão, 2008). With each new cohort, we realized that design fiction and critical and speculative design did not mean the same as in the places of their origins (Gonzatto et al., 2013). We were in a Brazilian university, so we had to approach these topics in the underdeveloped reality in which we lived. This reflection resulted in lessening the ecological view of interaction design and, in turn, in strengthening the dialectical-existential perspective on human interactions (Gonzatto, 2018; Vieira Pinto, 2015a).

While reflecting on the first series of experiments, the authors noticed that students had a hard time — and perhaps lack of motivation — to grasp historicity. This educational challenge raised a hypothesis (Bang et al., 2012) in the design research program: introducing a new kind of artifact that requires conjuncturing before conjecturing could perhaps help students develop a higher handiness degree over existential time. Existing speculative design artifacts such as video prototypes (Tognazzini, 1994), scenario props (Dunne, 1999), pastiche scenarios (Blythe & Wright, 2006), diegetic prototypes (Kirby, 2010), counterfactual artifacts (Wakkary et al., 2015), *offjects* (Encinas, 2018), and *spimes* (Stead et al., 2019) are well suited for conjecturing possible situations in the future (or in the past). However, they are not meant to conjuncture — to bring together — the multiple determinations of a given historical situation. Conjecture without conjuncture neglects human historicity as changes always come from handiness. The result is often a decontextualized speculation that contributes little to collective existential projects. Reflecting on the shortcomings of existing approaches to speculative design, we developed a range of conjunctural artifacts: tools, objects, and instruments taken from a local handiness that helps to realize multiple historical determinations and possible pasts and futures within it.

In each experiment, a conjunctural artifact was proposed based on the authors' progressive understanding of student handiness and the practical challenge of handling existential time (see Table 1 for a summary of all conjunctural artifacts). Design students reconstructed the artifacts as part of their learning tasks. The first experiments tried handling existential time with anachronistic photos taken from existing technologies, and the last included mockumentaries about present controversies involving emerging technologies. We noticed that each artifact enabled handling existential time in a different handiness degree, depending on its relationship with student backgrounds and the larger socio-political context.

Conjunctural artifact	Description	Summary of student handiness
1. Anachronistic photos	A photograph taken from an existing technology makes it look like a futuristic technology, usually taken with a macro lens and close framing not to be entirely recognizable.	Students took pictures with smartphones or digital cameras of technologies they already have access to. They used their developing repertoire of science fiction and design fiction to make meaning from the photo. The exercise builds upon knowledge acquired in the Photography course from the bachelor program, such as framing usual things in unusual perspectives.
2. Improvised videos	Short videos taken with smartphones featuring a speculative interaction with a mockup or an environment (Van Amstel et al., 2018).	Students used standard technology they carry with them in the usual way: shooting amateur videos. They chose the filming sets among the environments they inhabit, particularly the places they hang out at the campus. Objects lying at these places became props for interactions. The eventual post-production relied upon knowledge and software they acquired from previous experiences in the bachelor.
3. Emotion freezer (Figure 9)	This cultural probe (Gaver et al., 1999) asked students to collect the social pressures felt along a week and register it using play dough (Van Amstel & Gonzatto, 2020).	The teachers provided the probe materials (ice mold, medicine dispenser, and play dough), yet students had to capture everyday feelings and reflections with the probe. This probe hinges upon self-care, interpersonal relations, and the understanding of what counts as social pressure.
4. Retrospective interviews	Video of interviews with people close to the students, reporting on what it was like to relate to an object that was popular in its time (decades ago), but that is no longer common.	Students were prompted to reach out to their parents and older adults, learning about the histories of their families, friends, and the city they lived in. The objects possessed by the interviewees looked of no use to students until they learned about their context of usage.
5. Object ecology map (Figure 2)	Showing an object that has endured many decades and telling the human stories that this object was part of, highlighting its relation to other objects, places, and people (Forlizzi, 2008).	This artifact builds upon the retrospective interview, combining the findings from multiple interviews. While drawing relations between the found objects, students remembered, discovered and discussed issues not raised by the interviewees. The relations were drawn with strings tied to pins over several corkwood plates, which effectively grouped the objects.
6. Historical ecosystem map (Figure 3)	Map with a conceptual diagram of the ecosystem of interactions between people and objects in a specified past or future. These objects were firstly used as protagonists of	Teachers provided a corkwood plate, pins, strings, Lego building blocks, and a printed map of Curitiba city. Students brought their memories and imaginations about the featured objects. They improvised stories based on narrative tropes acquired in the previous Scripts and Narrative course. They

	an object theater (Buur & Friis, 2015) and, second, mapped to local ecology.	used these materials to visualize the ecosystem in a similar way in the previous Information Design course.
7. Image theater (Figure 10)	Representing an oppressed situation through a polysemic static image improvised from the available bodies, space, and stuff (Boal, 2000).	Students used their everyday body expressions to represent an oppressive interaction they either have experienced directly or heard of in peer conversations. They also relied upon previous experiences in playing mime games. Teachers provided simple costumes and props for making the image. The classroom furniture was often rearranged to set the stage.
8. Forum theater (Figure 4)	Representing an oppressed situation through a short play improvised with the available bodies, space, and stuff. The audience eventually replaces the actors and tries reacting to the oppression (Boal, 2000).	Similarly to image theater, this artifact used everyday body expressions and simple costumes and props. Forum theater demands a historical understanding of oppression to present a coherent story that tells what happened before and after the oppressive interaction. The forum opened up the debate for bringing in the feminist, decolonial, and other anti-oppressive theories the students knew to the test of (existential) time.
9. Retro-futuro timeline	A timeline board is divided into decades that help move ideas in post-its and pictures around to create historical detour points and counterfactuals (Eriksson & Pargman, 2018; Huybrechts et al 2017).	Students sorted through the timeline the printed pictures of urban/national situations they wanted to include in the design fiction project. They also included some of the anachronistic photos as props for new technologies. The memories and imaginations sparked by these pictures were shared in the conversation among the students. Pictures were often moved from one decade to another, as the storyline developed.
10. Technosocial design script (Table 2 and Table 4)	A template to define the human and other-than-human actors of the design fiction and to speculate about their interactions as part of social and technical changes.	The script template stimulated a dialectical understanding of the relationship between technology and society. The previous courses have prepared students to understand and imagine mostly technical changes. Through problematization and instruction, the teachers helped them to realize social changes.
11. Visionary photomontage (Figure 7)	A photo from the past edited to look like a scene from the future. Grayscale pictures had technologies of the future in color for improved contrast.	Students had to search for pictures in online repositories and archives. They had to look at these pictures and imagine possibilities of localized futuring. They had to combine pictures in photomontages and solve treatment issues, using the knowledge acquired in previous courses on Photography and Image Editing.
12. Design mockumentary (Figure 6 and Figure 11)	A short, 5-10 minutes, docufiction movie (Springer, 2005) about a future reality that has already happened in a past reality.	To produce this movie, the students had to write the technosocial script, produce visionary photomontages, plan and execute video recordings, prepare and organize the visual materials, create the movie montage, and publish it on Youtube. It required diverse knowledge, yet students already had similar experiences in previous or contiguous courses. Understanding recent facts of urban national histories was key to creating believable counterfactuals and developing the storyline.

Table 1: Conjunctural artifacts created from student handiness, presented in the order

they were typically generated in the studio.

The intention to produce design fiction *from our reality* manifested in three significant changes in the studio: a) bringing in more of the students' own lives (their knowledge, techniques, and artifacts); b) seeking for and creating various histories (personal or national); and c) deepening the understanding of the locality (from the city to the country). The students responded cautiously but firmly. Since 2013, when Brazilian democracy shifted to a state of constant turmoil due to massive street protests, students brought local and national political issues to discuss and relate to interaction design. The most vigorous debates emerged in the months that preceded elections. In 2014, the FIFA World Cup happened in Brazil just some months before the national elections, and protesters occupied the competition venues to demand more healthcare investments. Students included, then, images and memories from these demonstrations in their fictions. In 2016, a similar movement happened in Rio de Janeiro's Olympics, culminating with the *coup-d'etat* that led to President Dilma Rousseff's impeachment. Students vigorously discussed the role of Curitiba in these national events as the powerful jurisdiction of the *Car Wash* investigation that blasted the President and dozens of other politicians, including former President Luiz Inácio Lula da Silva. In 2018, Lula was imprisoned there, right when he was at the top of the election polls for a new presidential mandate⁹. Curitiba appeared again in student projects. After the unexpected election of far-right politician Jair Bolsonaro by the end of 2018, they revealed a loss of hope in the nation and their futures. The design fiction took a darker feeling.

While students represented these recent facts as exceptional, we problematized that political upheavals were common in Brazilian history. We often returned to the military coup of 1964 as an example of a recent history that could have been prevented from repeating itself. Some students, though, did not agree with us that this upheaval was a *coup-d'etat* and that the military had cut citizen rights from that point onwards. Echoing the far-right discourse, they argued that significant technological and economic progress compensated for any eventual liberty loss. We kept the debate open and respectful, so these students could also express their understanding next to the colleagues who stood in the opposite position as we did. Believing in the need for dialogue (Freire, 1970), we thought this to be essential to restore the belief in democracy and politics, which was under heavy attack at that moment — and still is at the (existential) time of this writing.

In Brazil, like in many Latin American nations, national history is forced to repeat (Stern, 1996), mainly due to historical oppressions maintained in the background — a.k.a. the cycle of Macondo (Prado de O. Martins & Vieira de Oliveira, 2016). Even if the colonizers and the colonized change, the relation remains steady. Brazil was still culturally dependent on Portugal in the 19th Century, even if politically independent. In the 20th Century, many nations disputed the geopolitical influence over Brazil until the US reached the hegemony by supporting the military coup of 1964. US imperialism gave a new shape to colonialism, which maintained technological and economic dependence while concealing political dependence under shady interventions. Even if this resulted in a more liberal economy in Brazil, the

⁹ As a result of that, Lula could not compete for the elections and Jair Bolsonaro won the 2018's elections. A late investigation conducted by the Supreme Court found that his trial was not fair and he was released from prison in 2019 and cleared out in 2021. Lula remains to this day a key figure in Brazilian politics and popular imaginaries, as the design fiction projects described in the next sections can attest.

interventions did not push a full liberal agenda. For instance, women are still underrepresented in the face of patriarchy, and LGBTQi+ people suffer from religious prejudice. Reflecting on Brazil's recent history, Augusto Boal, the Theater of the Oppressed's creator, stated that "the fight against a single oppression is indissociable from the fight against all oppression, even if one of that seems secondary" (Boal, 1980, p. 156).

Inspired by Boal, we started experimenting with Theater of the Oppressed as a means to design oppressive and liberating interactions in our studio (Boal, 2000; Gonzatto & Van Amstel, 2017). We could then see how oppressors established themselves inside the oppressed through symbolic operations such as changing hope for waiting. To take this oppressor out, we experimented with altering cultural probes (Van Amstel & Gonzatto, 2020; Gaver et al., 1999) to identify social pressures experienced in existential time. Students even interviewed other people that faced similar pressures. Our studio aimed at producing critical and speculative designs from the historical oppressions that students had firsthand experience, not from oppressions they imagined someone else might feel — like typically done in speculative and critical design (Prado de O. Martins, 2014).

The intention behind all this was to put their hands on their collective future, mediated by the nation and other local identities. By getting a hold of this controversial object, they could realize they are already making that future right now in the present. Instead of articulating alternative presents from alternative futures using the now-classic speculative design cone (Dunne & Raby, 2013), we tried to raise consciousness of historicity, including the multiple relationships between pasts, presents, and futures, much like in transitional design histories (Göransdotter, 2020). The operation of anchoring an imagined future to an actual past (Otto, 2015) or an imagined past to an actual present (Soro et al., 2019) helped them to understand that speculative design does not necessarily mean going wild and importing futures without a critical review. Local futures mattered because students could have a higher handiness degree over them. Conscious of that, we, teachers and students, could realize the collective futures that were handy to us, not the ones that were handy to the developed nations.

Anthropophagy¹⁰ was a pivotal reference to our underdeveloped interaction design pedagogy (Van Amstel and Gonzatto, 2020; Van Amstel, 2012). Instead of denying developed futures, we incorporated them as part of our pasts. Anthropophagy led us to imagine a foreign technology's anticipation in the local past of interest as if they were made available by a detour point taken from the official historical narrative. Students got immersed in their handiness as there was so much more information about the locality's past than about its present. We devoured the past, digested the future, and absorbed the present, like modernists did with the native identity: they called *technicized barbarian* the native who enjoys modernization without losing its antithetical origins (de Andrade, 1928).

¹⁰ Anthropophagy was a very influential concept in national identity debate and Brazilian cultural production, from the Modernism movement of the 1920s extending to Tropicalismo and Cinema Novo in the 1960s, Manguê Beat in the 1990s, and Digital Culture in the 2000s. It originates from Manifesto Antropófago (de Andrade, 1928), a text that proposes the Other's creative and critical absorption. This image evokes a political position of cultural hybridism, where cannibalism is not a passive act of reception but creates a new Self from the Other. Anthropophagy can be considered a forerunner of later decolonial and postcolonial movements (de Souza, 2015). We describe our critical pedagogy as *the anthropophagic studio* (Van Amstel & Gonzatto, 2020) to emphasize the need of coming to terms with the standard design studio pedagogy.

Interaction design typically looks at synchronic relationships between technology and society in specific handiness. Since we wanted to explore historicity, we looked at diachronic relationships in multiple, developing handiness. We used decades as an existential time reference; however, we deemphasized developing the story linearly. We wanted to trace and speculate about discontinuous qualitative transitions, such as back and forth movements and implicit and explicit developments. The transitions had to be justified based on the conditions offered by the initial handiness, avoiding *deus ex machina* and other sorts of magical thought (Blythe & Encinas, 2016) that may (or may not) work as a quick fix for narrative holes. Each action had to have a reaction and so on, like in the dialectics of the old and the new previously discussed.

The final work required producing a design mockumentary¹¹ that brought together and articulated all previous exercises and experiences. We created this conjunctural artifact for several reasons. First, the audiovisual language helps articulate interaction language, which is not so visible otherwise (Van Amstel et al., 2018). Second, it uses the possibilities already contained in the present, keeping the speculative discourse linked to the possible, with objects and scenarios already found in students' handiness¹². Third, students could use their bodies, their voices, their imaginary memories, family objects, basically everything they had around. The rationale was that the final result should look like a mockumentary, but the process should focus less on the video's production and more on technology and society relations. We recommended students producing scenes that are easy to record, such as casting themselves as actors or interviewees, making collages of digital videos, and replacing the original audio track for a voice-over track. The process stands in contrast to the first sequence of experiments, which focused on mastering the audiovisual language.

Rather than relying on camera shots to produce the mockumentary, the students discovered that using archive video material (from sources like local news archive, Youtube, and the Internet Archive), they could meet the tight assignment schedule of 3 weeks. As long as they reproduced only short fragments of the videos, they respected the Brazilian law on fair use of creative materials. The materials appeared in short sequences, often without the original audio, replaced by a narrator's voice-over. The narration interpreted the facts differently from the original movie intended, as expected from a mockumentary, yet still supported by the freedom of speech right guaranteed by the Brazilian Constitution. However, some of the pictures lingered on a gray zone where parodies are typically found, in contrast to what

¹¹ The mockumentary is a type of docufiction that applies a documentary form to fictional content, in which "standard conventions of documentary film are being placed in the service of a satirical or ironic examination of a fictional subject" (Springer, 2005, p. 5). Design mockumentaries, as a counterpart of design documentaries (Raijmakers et al., 2006), aims at creating a reality that did not exist, does not exist, but that may exist sooner or later in the near-future, as design fiction likes to put (Bleecker, 2009). The humorous licence for mocking it up helps to bring to the fore concealed ideologies and political discourses (Gonzatto et al., 2010).

¹² Latin American literature often uses this strategy, particularly in the literary genre of *magical realism* or *fantastic realism*, which emerged amidst the dictatorial regimes of Latin America during the 1960s and 1970s. The main character is striving for verisimilitude, even when it addresses fantastic or unreal elements. The strange (or even absurd) is constructed narratively as part of the everyday (Bowers et al., 2020; Maia, 2016).

speculative design literature recommends: dark, satiric, and deadpan humor (Tonkinwise, 2014a; Dunne & Raby, 2013).

The ad-hoc instructions tried to help them recognize themselves as historical subjects. The projects were less about the future of technology (as if technology is a being in itself, that has a future of its own) and more about our students' future lives. The following sections describe two examples in depth so that the design process, learning activities, and conjunctural artifacts may become more concrete to the reader.

6. A design fiction about Curitiba as a prosthetics capital city

Prosthesis: The Next Level (2016) is a design mockumentary about the controversy generated by replacing healthy human limbs for advanced prosthetics in Curitiba, where great advancements in the field supposedly occurred. The mockumentary engaged with Curitiba's municipal elections, particularly with a mayor candidate's proposal to recover the city's position as an international reference on urban innovation¹³. The entrepreneurial program *Vale do Pinhão* (Pinon Valley) would bring Silicon Valley ideas and policies to the city, even if there were no geographic valleys around it. The main problem tackled by the political campaign was the difficulty of starting and growing a business in Curitiba, ignoring social issues such as the steep increase in homelessness, traffic jams, and gentrification. The campaign tried to position Silicon Valley's innovation model as the future for Curitiba.

Among the several design fiction developed as a counter-discourse to this campaign, we chose *Prosthesis* because it discusses how technology is intimately associated with collective existence. The controversy centered around posthumanist design issues (Forlano, 2017): did the prosthetics turn humans into non-humans, more-than-humans, or super-humans? The mockumentary does not answer the question but displays various perspectives, leaving it open for further debate and development. Instead of taking *Vale do Pinhão* future at face value, students pointed out that innovations have human costs that companies and governments often neglect when prioritizing economic indicators.

¹³ Among the many innovations, Curitiba is known for developing the Bus Rapid Transit (BRT) system between the 1970s and 1990s, which is now adopted by dozens of cities worldwide, particularly in underdeveloped nations. The same mayor that disputed and won the elections in 2016, Rafael Greca, was also the mayor that implemented a major step in the BRT system in 1992: the red bi-articulated buses that ride on exclusive lanes and stop at tube stations.



Figure 1: The relationships in Curitiba historical ecosystem map of the 1970s, as known by students.

The project stemmed from a joint investigation that involved the whole class in the first course weeks. To engage with the election debates in a dialectical-existential perspective, we proposed to study the city's past before speculating about its future, beginning with the 1970s decade, when mayor Jaime Lerner implemented Curitiba's first master plan¹⁴. We started by sharing all the city pasts students had at hand without accessing historical records. Following the ecological understanding of interaction design (Vassão, 2008; Forlizzi, 2008), we compiled Curitiba's urban ecology map in the 1970s (Figure 1).

The map broadened the relationships considered by individual perspectives and made them reflect how little they knew about the city's past. None of the students were born at that time, yet some had objects from that time at home. We asked them to bring an object like that to the next class, complemented by an audiovisual interview with that object's user, mostly their parents and grandparents. We expected these conjunctural artifacts could help students become more conscious of their family handiness. Students first laid down the objects on a table and drew the relationships between them using elastic strings and talk. After the objects were laid down and related, we played the interview records to complete the understanding of existential time (Figure 2). The object ecology map was much more concrete than the urban ecology map due to the personal histories and specific relationships. The stories revealed the handiness relationship that kept the object in use or possession up to these days.

¹⁴ Jorge Wilhelm's master plan (1965) and Jaime Lerner's leadership are often referred to as examples of sustainable planning in the urban planning literature (Rabinovitch, 1992; Macedo, 2013), despite its controversial top-down change model (De Oliveira, 2000). In any case, the city administration did not have or adopt a master plan in its previous 272 years of existence.



Figure 2: The object ecology of Curitiba in the 1970s.

While debriefing the map and the interviews, students reflected that existential time seemed to pass slower in the 1970s than in the 2010s:

Teacher A: Time went slower?

Student A: Yes, for example, today you listen to 50 songs in one day. Not then. You stopped to listen to music, you stopped to have coffee, you stopped to do things.

Student B: ((jokingly)) There was no internet...

Student A: Today things are very fast...

Teacher A: ((connecting their lived present with that reconstructed past)) What was closest to the internet at that time?

Student C: The Post Office.

Teacher A: ((pointing at an object brought to the table)) What about MAD Magazine, was it any closer to the internet?

Student D: ((referring to the magazine interviewee)) He said he shared, right?...

Student E: ((picks up another object on the table)) I think the newspaper is more like

it because it comes out more often.

Student F: The TV too...

Student G: The lack of technology, on the other hand, made people lighter (inaudible)

Student H: Less robotic...

Teacher A: More focused, right?

Student G: Yeah. You will stop for coffee. As I said, nowadays you do this and this... ((simultaneous activities))

Student A: You can say the same about photography. You stopped to take a picture.

This fragment of the debriefing dialogue offers some everyday examples of how existential time manifests in the production of existence. The dialogue also exemplifies how teachers and students collaborated to handle existential time in progressively higher handiness degrees.

After realizing the existential relationship between locality and temporality, they could finally start the design fiction project. To help students create the storyline, we provided them expressive materials to brainstorm the story while improvising it. Instead of saying "the character does this at this moment," we encouraged them to pick the object representing the character and do the action like in object theater (Buur & Friis, 2015) and make-believe (Vaajakallio et al., 2014). The humorous atmosphere generated was vital to enable an expansive exploration of possibilities in narratives and design discourses (Gonzatto et al., 2010). When the story settled, we proposed them to analyze and ground it firmly on Curitiba's ecosystem, using a combination of maps (Figure 3). They grounded their speculation on the map, which became more focused on urban relations than on the characters. In previous lectures, we emphasized that urban relations such as gentrification emerge from oppression relations like worker exploitation, racism, xenophobia, and religious intolerance.



Figure 3: Students ground their story in historical and spatial relationships using the combination of a historical ecosystem map and a geographical map.

To problematize the urban relations featured by the stories, we held two sessions using Theater Forum, a technique borrowed from the Theater of the Oppressed arsenal (Gonzatto & Van Amstel, 2017; Boal, 2000). Students improvised a short play of two to five minutes depicting the moment when oppression relations are explicit in the story. After presenting the play, we invited students from other groups to propose a character's reactions to the oppression. The audience replaced the initial actors as soon as someone got an idea on how to react better. The remaining actors stayed in their roles and provided resistance to the reaction.



Figure 4: Simple costumes and props for improvisation. Using a mechanical hand toy, a student performs the role of a worker who lost his limb in a work accident and suffered from prejudice after getting a prosthetic limb.

In a play about worker exploitation, a student from the audience tried to react to extreme workload and lost a limb in a work accident. Following the Theater of the Oppressed's joker system, we provided simple costumes and props as resources for improvisation (Figure 4). The student took a mechanical hand toy and used it as an advanced prosthetic limb. With the prosthesis, he could lift heavy weights with little effort, resulting in more efficient work performance. However, he faced prejudice from his peers and the company ended up firing him. Unable to get a job at any company due to ubiquitous ableism, he used his condition to draw public attention to worker exploitation. A very successful political career and a new identity followed: the worker became known as Little Hand. Elected as the President of Brazil, Little Hand was soon approached by the prosthesis manufacturer who offered him a bribe in exchange for a public policy that stimulated limb replacement. The state provided free prosthesis to unemployed workers, increasing their chances in the job market. The policy worked so well that the prejudice was inverted, and people who did not have a prosthetic limb start losing job opportunities. The story ended with a *deus ex machina* solution: Little Hand endorsed a biomechanical prosthesis indistinguishable from natural limbs.

The improvised story of Little Hand resembled that of Luiz Inácio Lula, a trade union leader who lost a finger in a work accident and was later elected the President of Brazil in 2003 and for a second term in 2007. While the course unfolded, in 2016, the *Car Wash* investigation was checking if Lula accepted bribes. Instead of focusing on the worker exploitation oppression that Lula and Little Hand worked against, the team of students who picked up this story for further development decided to focus on the oppression of ableism, i.e., considering people with disabilities inferior to people without disabilities. The technosocial design script of *Prosthesis* (Table 2) starts with ableism and culminates with worker exploitation. The technology develops linearly, while social changes follow. As a result of the prevailing technological determinism, there was no reaction to oppression in this script. We problematized this bias and assisted students in including some reactions to oppression in our ad-hoc instructions.

	Technical changes	Social changes
1970	Prosthesis development testing phases, only celebrities, and rich people could get them.	People who use prostheses suffer from prejudice.
1980	Safer prostheses.	Prostheses are for sale to athletes but are not very popular. People who use them continue to suffer from prejudice, even if accepted by society.
1990	Prostheses with models that generate greater performance.	Prostheses are for sale to the public, with accessible prices and models. Prostheses are beginning to be well regarded by society, and many people are beginning to use this "service".
2000	Specific prosthetic stores. Personal mechanics.	Prostheses become a standard of beauty, resulting in contests for better prosthesis, better customization, etc. Athletes opt for prostheses even if they do not have a disabled or amputated limb. The Paralympics have now surpassed the conventional Olympics.
2010	Companies require prostheses from their employees.	Prostheses are now highly valued before society. People who do not use prostheses are the ones who suffer from prejudice.

Table 2: The technosocial design script for *Prosthesis: The Next Level* (2016).

After deciding on the storyline and before writing the full movie script, we asked them to create a quick and dirty storyboard to envision the footage search requirements and realize how to tell the story using the movie format. Instead of dividing the story into a sequence of technical scenes and social scenes, the students used this opportunity to synthesize changes in a coherent counterfact. They managed to soften technological determinism and anticipated the camera shots they would need (Figure 5).

		
<p>Cena 1: narrativa apresentando história</p>	<p>Cena 2:entrevista do filho do atleta</p>	<p>Cena 3:narrativa explicando conflitos e preconceitos</p>

Figure 5: Partial view of the storyboard of the mockumentary made from a mix of pictures taken at home (middle) and borrowed from online newspapers (left and right).

After writing the script, we suggested shooting a crude version of the movie right around the classroom to try out the combination of images and speech. The students simply read the script in front of the camera when they were supposed to perform as characters and displayed placeholder images. This suggestion enabled them to anticipate additional details for camera shot production while also testing the movie cuts.

The final movie includes live shots, modified archival images, and audiovisual design screens. The live shots featured students acting as characters of the story, with fake names, organization positions, and appropriate costumes. The costumes were drawn from their wardrobes or borrowed from friends. Unusual campus locations, framed in close-ups and illumination settings, made the recording sets (Figure 6). The same students that collectively wrote, directed, and produced the mockumentary, also acted on and off the screen. The mockumentary narrator had an essential role in producing the suspension of disbelief, modulating a specific voice intonation, and adopting a semi-formal language.

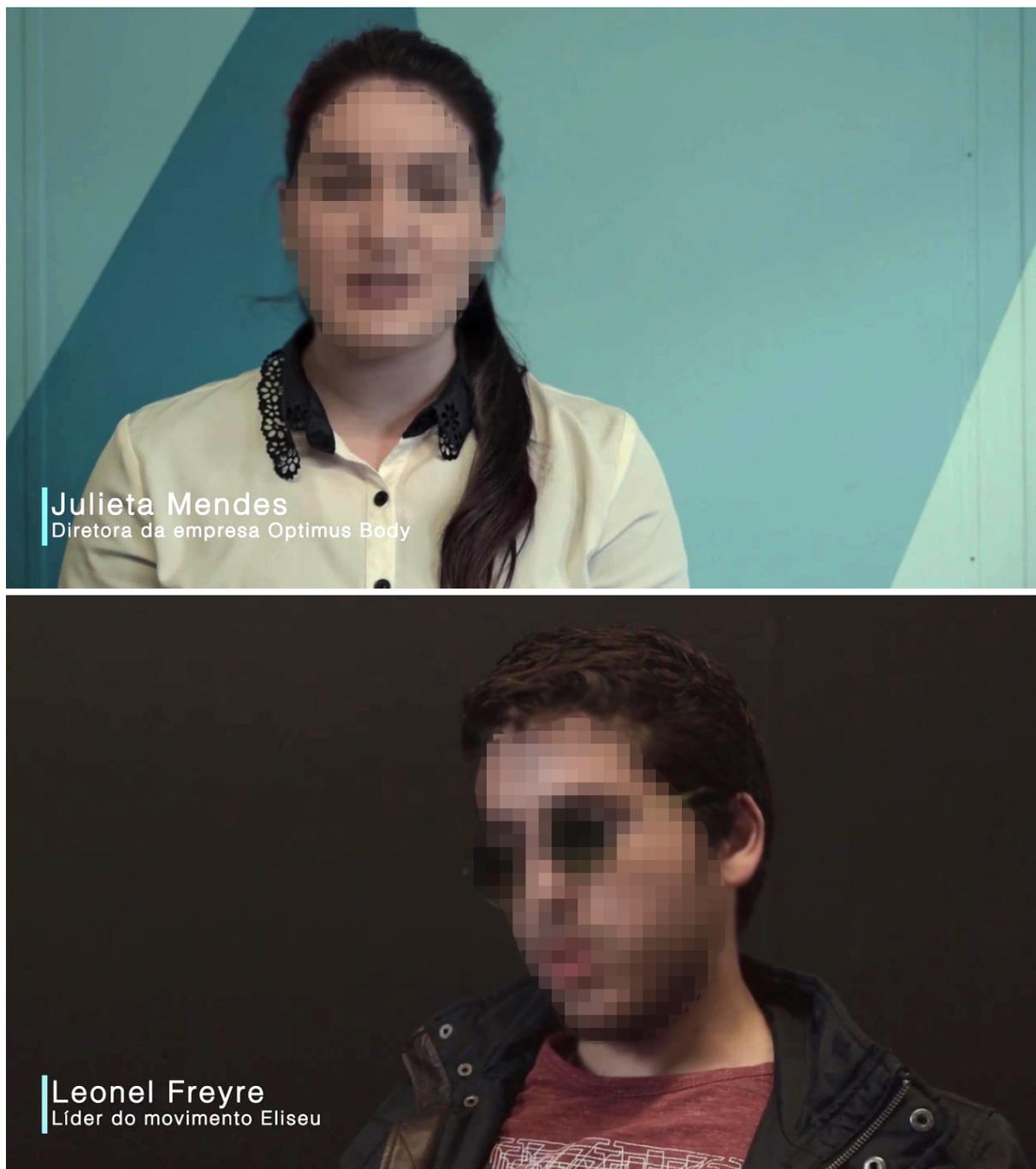


Figure 6: Live shots featuring students as story characters.

The narrator starts the film by telling the story of Eliseu Aranha, a fictional athlete who lost his leg in a car accident. He was the first public figure in the fictional world to use and display a prosthetic limb to continue progressing in his career as a sprinter. His story resembles the factual story of Oscar Pistorius, a South-African sprinter, who became famous for competing in similar conditions with athletes that did not have any disability. Inspired by Eliseu, many people with disabilities purchased advanced prosthesis, and the product became cheaper and widely available. Eliseu became a symbolic figure for a social movement composed of prosthesis owners that fought against ableism. This movement eventually clashed with the humanist's movements, who claimed that people with prostheses were outperforming *normal* humans, taking their jobs, and running against the natural conditions devised by

God. This counterfactual discourse draws arguments from the evangelical politicians who campaigned against the existence of LGBTQia+ people in the Brazilian nation and from the fictional discourse of Little Hand in the inverted ableism situation represented in the Forum Theater.

The story was visually tied to the locality through visionary photomontage, made from modified archival images. They were displayed late in the story when it revealed the main counterfact: that the manufacturer of advanced prosthetic limbs originated from Curitiba. Optimus Body, the company that made advanced prosthetics into a consumer product, employed modern design and luxury marketing to impel people who did not need prosthetic limbs to consider replacing their natural limbs with artificial ones. They rebranded prosthetics as a fashion accessory, similarly to the fact that Apple rebranded digital music devices and smartphones. Sound evidence of the counterfact was needed because it was easier to believe that people would amputate healthy limbs than believing that a company as successful as Apple would have started in Curitiba. Students then created a modified picture of a nostalgic place at the city center with the fictional company store façade (Figure 6).

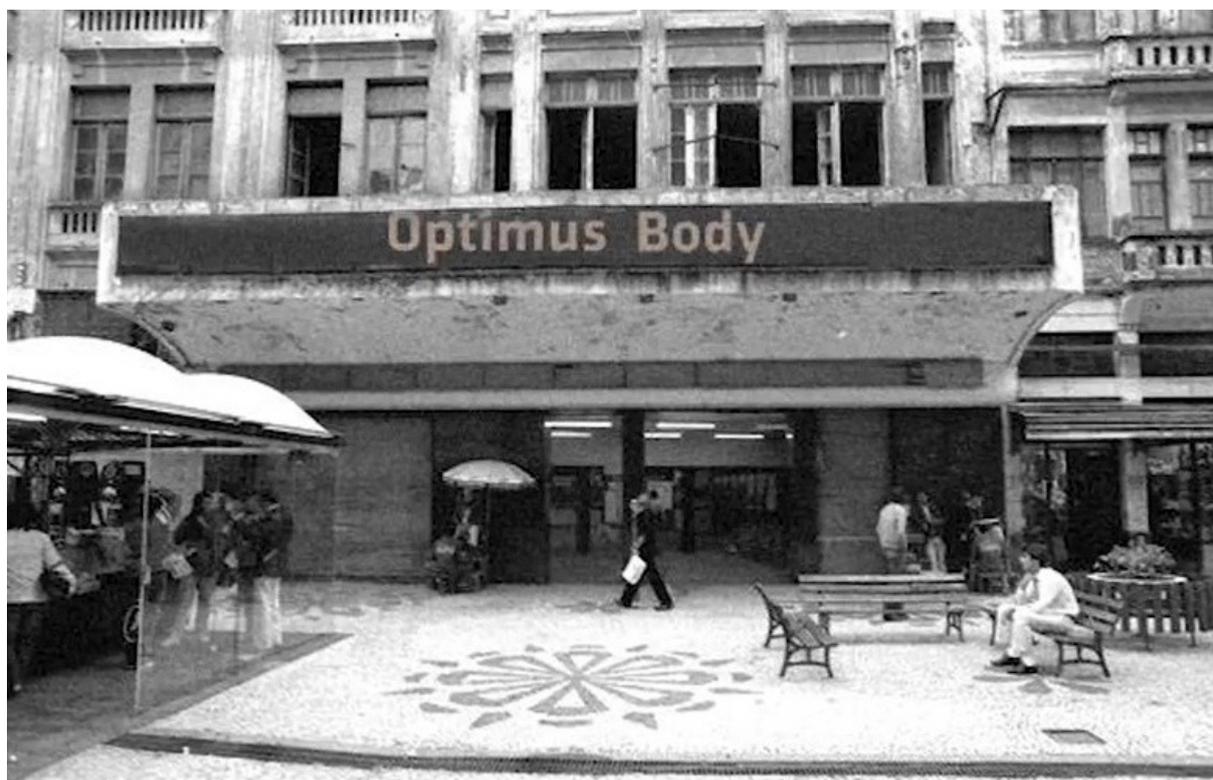


Figure 7: A visionary photomontage from Curitiba city center featuring the fictional prosthesis manufacturer store.

The story reached its climax when a tapped phone conversation between a company representative and a medical doctor was revealed. The story presented this counterfact through an audiovisual design screen (Figure 8) that is quite similar to the ones used to report the leaked *Car Wash* recordings¹⁵. In the conversation, the doctor calls the

¹⁵ One of these leaks was essential to turn the public opinion against President Dilma Rousseff in 2016 and enabled her impeachment in that same year. In it, Rousseff was negotiating her invitation to Lula to become

representative to order a pair of crutches for a patient. Instead of answering the order, the representative persuades the doctor to amputate the limb in exchange for a bribe. After the case went public, Optimus Body fired the representative and cooperated with the Court in his trial. The last camera shot features Optimus Body's director saying that the company had no relation whatsoever with the incident.

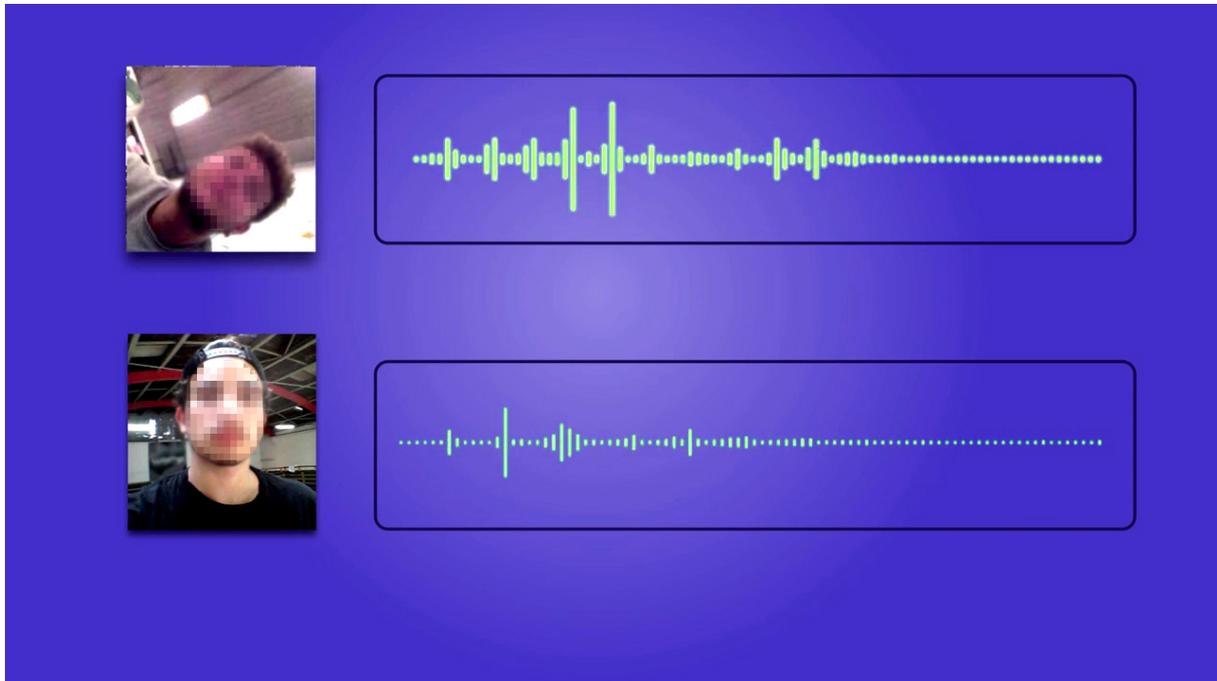


Figure 8: A tapped phone conversation audiovisual design screen produced for the mockumentary.

The mockumentary ends with the counterfact that Curitiba became the number one in the world in the number of prosthetic users — concerning the population size — and a reflection that the conflicts stemming from the inequalities increased by the technology were far away from disappearing.

The mockumentary did not develop further the public-private corruption that inverted the oppression in the improvised theater story of Little Hand. Instead, they shifted the story's protagonist to the company that manufactured the advanced prosthesis, as if their marketing and design strategies have influenced the change. As for the worker exploitation oppression, this turned into inverted ableism, in which humanists claimed to be the oppressed. The countefacts presented did not support this claim, as some employers pushed their employees to replace their limbs against their will. The narration does not tell that, but it is implied that many users might have been pushed into prosthetics by social pressures coming from all sides.

The alternative present constructed by this mockumentary contrasts with the bright future painted by the political campaign focused on Curitiba as an innovation hub. Innovation

the Minister of Home Affairs. The press blatantly accused Rousseff of trying to protect Lula from the Car Wash corruption investigation while hiding the fact that tapping the President was illegal in Brazil. The judge that leaked these recordings to the press, Sergio Moro, was ruled biased by the Supreme Court in 2021. As a result of this suspicion, Moro's verdict against Lula was nullified.

seems to have helped to overcome ableism at the beginning, as in Eliseu Aranha's case. However, as soon as it is commodified and exploited by a deregulated market, it is turned against the oppressed. This operation was not straightforward for the characters since the company marketing and public relations tried to cover up what was going on. The religious humanist group served as a counterpoint to prosthetic enthusiasts, yet using arguments that fueled the existing prejudice. The controversy between the interested parties supposedly motivated the (mocked) documentary. This controversial design fiction starkly contrasts with the one-side representations of the future that is so common in this genre.

7. A design fiction about the AI that displaced the President of Brazil

The design fiction project described in this section shifts the focus from alternative pasts to alternative futures and from the urban sphere to the national sphere. *Time Crisis* (2017) is a design mockumentary that provides a different explanation for Brazilian President Dilma Rousseff's impeachment in 2016: the unauthorized delegation of national affairs to a foreign Artificial Intelligence (AI). It is now an accepted fact that President Rousseff was removed from office without sound evidence against her. The new President Michel Temer radically changed the government priorities and embarked on labor law reforms, which affected students with a less promising career.

The mockumentary motivation emerged when students shared the social pressures they felt in everyday life using the emotion freezer cultural probe. This cultural probe was built with ice mold and play dough and used to collect students' social pressures along the week (Van Amstel & Gonzatto, 2020). The task consisted of kneading the clay in a shape that better expressed the pressures felt each day. Many reported being concerned with existential time, expressed in terms as simple as "Time" or more elaborate forms like "Building a future", "Uncertainty about the future", "Being fast", "Being old fashioned all the time", and "Feeling guilty for gaming" (Figure 9).



Figure 9: The result of the emotion freezer cultural probe that collected the social pressures felt by one student along a week (left side) and the pressures that were common among the students (right side).

We proposed that students organize in groups to develop the interaction design project based on the pressures they share, yet we did not control the organizing. Among the groups formed in this way, one focused on capitalist time pressure. The groups had to deepen their understanding of the oppression and present it as an Image Theater (Boal, 2000) in a subsequent class. The method consists of expressing oppression using body language, simple costumes, and classroom space. The audience then tries to guess which kind of oppression is that, who is the oppressor and the oppressed, and how they interact.

The first image presented by the time pressure group reflected their everyday dilemma of either playing games or studying to get a future job. They noticed that the same technology introduced the dilemma in their lives: the computer, a tool that can be used both for work and leisure. This dilemma's practical result was a low work-life balance and guilty feelings when having pleasure (Figure 10).

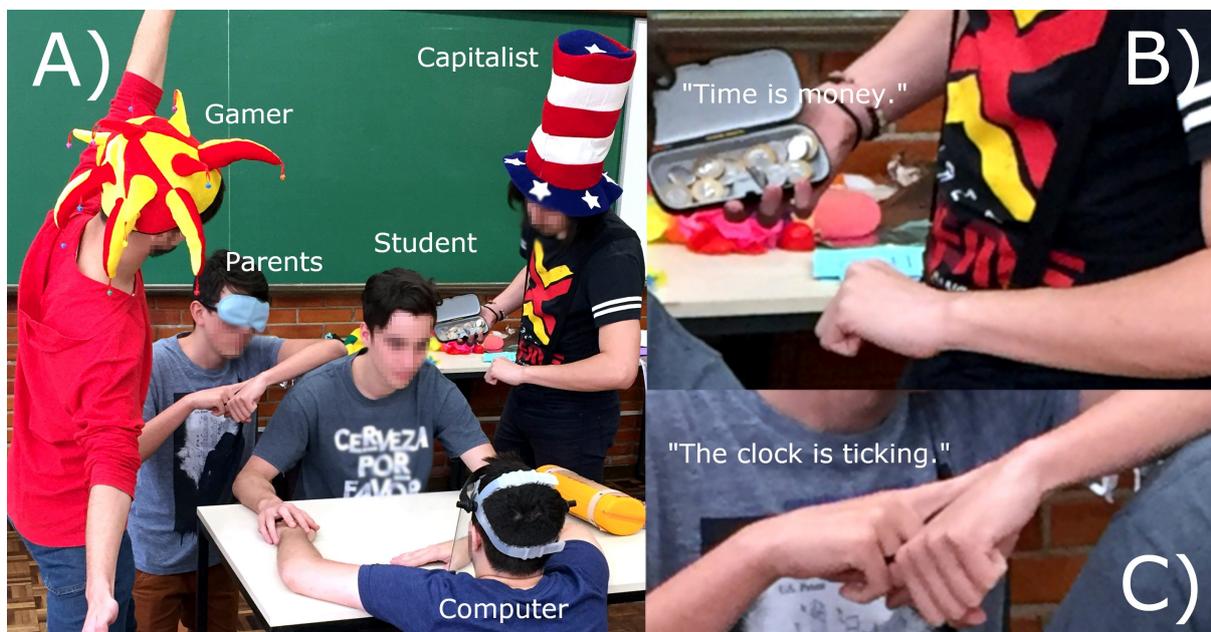


Figure 10: Image Theater scene that explores how time is used to oppress students. The same computer that brings the possibility of online gaming and entertainment (A) also brings forth the capitalist logic to everyday life (B), producing the feeling of guilt about time spent on having pleasure (C).

After the initial discussion based on the static image, the audience joined the play by replacing the actors and reacting against the oppression. They tried getting help from parents, which resulted in increased pressure. They configured the computer to impose time limits on gaming, but they could not follow them since the same computer started showing gaming ads on websites they used for studying. After these failed reactions, they tried to gamify the profession by replacing the study diploma for a design portfolio based on points earned from delivered projects. This reaction resulted in a profound change in the design school, which started acting as a liaison between students and companies. The companies

provided challenges for students in exchange for a project that added points to the student portfolio. Accordingly, design education became less critical and more instrumental. Students with a higher amount of points had a better chance of getting a job after graduating, which worsened the student alienation, employability, and time pressure. The last attempt was to quit the university and open a new company, following Silicon Valley's entrepreneurial attitude. The student attitude gradually led to an in-depth exploration of worker exploitation, including liberal capitalists and trade union perspectives. Instead of having more time, the small entrepreneur became tied to unfair contracts with larger companies that required fast and cheap work, which could only be obtained by hiring temporary employees in precarious conditions (Antunes, 2018).

During the sessions, as more elements of the students' handiness came into question, the shared understanding of oppression evolved. The students soon realized that technology did not impose time pressure on them, as if it was an autonomous agent. The technology was just the point of contact with a social pressure that stems from the existential project of capitalists and their supporters. The problem with this existential project is that it includes the denial of workers' existential projects. Existential time, in this case, is the expression of the historical class struggle (Harvey, 2007).

The session did not aim at generating a new technology that is capable of overcoming oppression. Instead, we wanted to imagine a sequence of reactions from the oppressed and counter-measures from the oppressors. Students reflected that this was a big challenge:

Student J: When we end up in the role of the oppressed, it gets a little difficult to get out of it. Because if we are oppressed, theoretically we are already in a situation where we have no escape. If we knew how to escape and had several alternatives, we could find a way, but ... most of the situations that we find, at least in Brazil, they lead us, the people, the ordinary citizen, to be an oppressed.

Student I: Especially here in Brazil. As we saw in this last play, starting a company is tough due to all the paperwork needed. In the United States, you can open a company in the morning and close it in the evening. We pay a lot of taxes. Our situation can be said to be much more oppressed than other countries.

Student M: But in the United States, you can live on public income. The starting company, as far as I can tell, has an initial funding that serves to keep you in your job (inaudible) like a program that supports an entrepreneurial culture for those who are starting, an initial amount.

Teacher B: It is the micro (entrepreneur) theory. Even so, the bureaucracy to close a company is very complicated. Closing things in the right way... and to understand how it works...

Student N: So, my boss, he was an entrepreneur, but he still needs to have employees... Here is what happens: I'm a copywriter and he works for the rich people. He needs a person to stretch his work. He could hire me, but no. He doesn't.

Otherwise, he would already be an medium-sized entrepreneur and, due to that, he would have to pay more taxes. This does not fit his budget. That's why he works alone.

Teacher A: Okay, that point we could discuss forever. But let's go back to the oppressions that Teacher B raised.

Teacher B: We spent a moment testing things. And now (we should) reflect on these tests, right. This moment when we did it, we already have our life as something that we continue to prototype these reactions... (and here) we have the theater. But, how was the experience? She ((Student J)) really... commented during.... it seems that there is no way out. Is that the (real) feeling? Or not?

Student I: Yes, at all times.

All: [laughter]

Student I: So, we are trying to get out, or trying to follow something that has already been proposed, and that can work as well as not work. We walk a tightrope with a stick.

Student P: Every way out you try, it ends up being a kind of oppression... that we saw in the theater. In the first two (plays) I think. All the exits that you tried, you talked to people, and it resulted in oppression. But that thing, that overcoming... oh, no... That overcoming is temporary! Another oppression will always appear.

In this dialogue fragment, students realized that the future promised by Silicon Valley was unattainable in the condition of underdevelopment, even with *Vale do Pinhão* easy paperwork policy and the latest Brazilian labor reform. By comparing the Brazilian situation against the US situation, they noticed that the entrepreneurial culture often hides work exploitation. Even if they could not find a way out of work exploitation oppression, they generated a design space of possible actions and reactions. Creating this design space constituted the bulk of the work involved in the mockumentary, which intended to communicate a historical path taken through this space. To assist them in this task, we added a new line in the technosocial design script template to define their oppressive interactions (Table 3). This line prevented students from framing technology as an inscrutable oppressor, as it happened in past cohorts.

Interaction	Oppressor	Technology	Oppressed
Human-computer	Workers and students have many responsibilities and tasks with little time to fulfill them	Computer and time	Bosses and teachers

Table 3 - The characterization of the oppressive interaction made by students of the existential time group using the provided template

After defining the story actors and their fundamental relation — oppression, students started to discuss and sketch the timeline of changes they would like to cover in the mockumentary. We also provided a template with technical changes on one side and social changes on the other side. The social changes were indeed harder for students to imagine. Some student teams treated social changes as direct effects of technical changes, rendering a deterministic approach to interaction design. However, our ad-hoc instructions provoked them to reinstate the dialectics between those two courses of change. Table 4 shows that, in this example, the social changes fueled the technical changes in strict dialectical logic, only interrupted by the presidential scandal.

Time	Technical changes	Social changes
1981	Personal computers are launched.	People start spending time exponentially in front of computers.
1990	A huge number of families have computers at home. Companies start using the computer as a faster way of working. As computers enable multitasking, jobs get heavier.	The same work achieved by a writer in 3 weeks could now be done in 2 days or less. The result is crowded offices with multiple computers and workers, spending hours in front of screens, to cope with a huge demand for work. Workers do not have enough time to complete all of their tasks.
2006	Technology development enables faster computers, in addition to portable versions (laptops and tablets).	A huge increase in procrastination, futile content, and waste of time. People do many things with computers, but at the same time, they do nothing, getting nowhere. People try to use specific methods to make better use of time, without success. With each new attempt, time seemed to be even more wasted.
2014	Two presidential candidates have specific proposals to optimize people's time based on their political ideologies.	Candidate Dilma wins the elections with the proposal of a mandatory answering machine that helps optimizing user time. Government agents go from house to house to install the answering machine in older computers. All of the new computer models in Brazil come with an installed version of it. Dilma is manipulated by the secretary and ends up being removed from the office. President Temer takes over and implements labor law reform.

Table 4: The technosocial design script of *Time Crisis* (2017).

In *Time Crisis*, students took some sequences from an interview with Russian comedian Mikhail Zadornov in which he extols Stalinism and contends homosexuality. They added a translated subtitle that changes what Zadornov says into a complaint about the lack of time brought by using computers in his writings, and an endorsement of their error correction features. While doing so, they relied on the low probability that the mockumentary audience could understand spoken Russian and notice the purposeful translation infidelity.

They also produced counter-documents to support their narrative. When describing the scandal that afflicted Aécio Neves during the presidential elections disputed against Dilma Rousseff, the mockumentary features a screenshot of a fake Gmail account of Aécio Neves's writing to his party fellow that even he does not believe in his nationwide citizen secretary service (Figure 12). This counterfact draws from the fact that the previous President of the Chamber of Deputies, Eduardo Cunha, was overthrown and imprisoned due to corruption

charges based on proofs collected from a secret Gmail account in 2016. Dilma Rousseff was also involved in a scandal involving Gmail in 2014 when she discovered through Edward Snowden's public leaks that the NSA was spying on her. After that, she stopped using Gmail and pushed the national development of secure open-source systems for official communication.

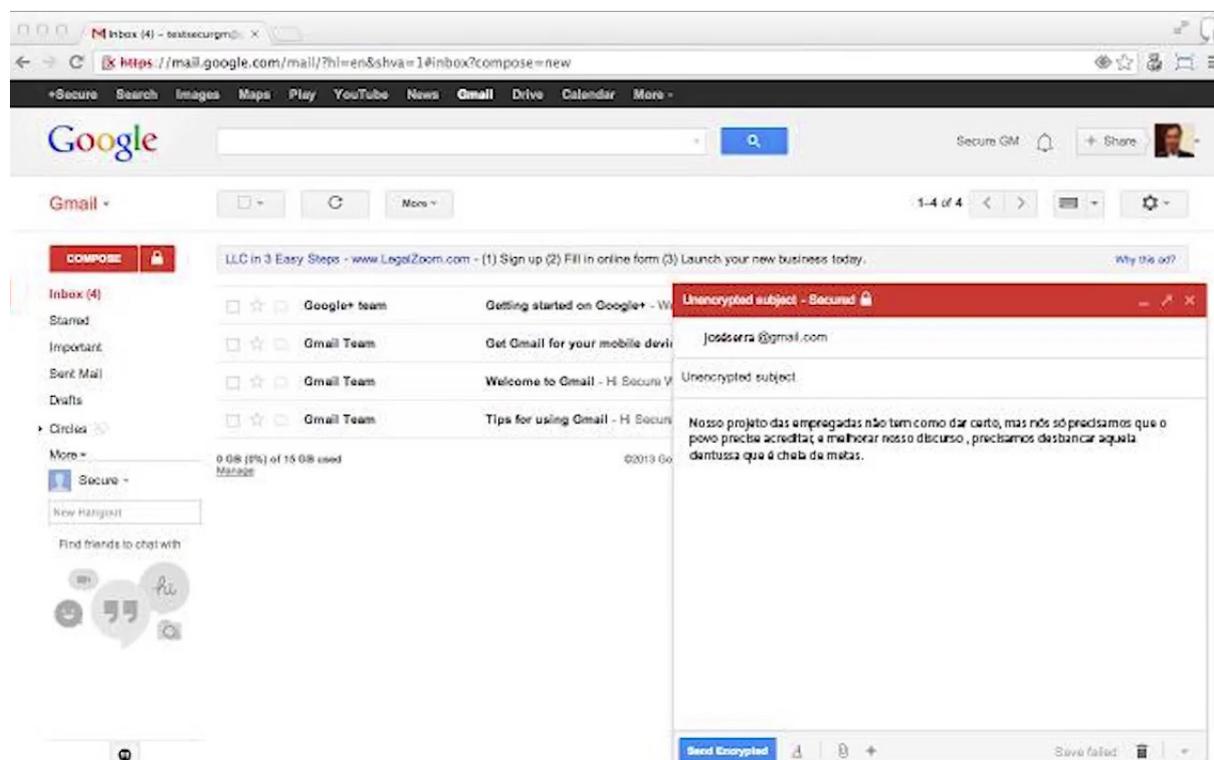


Figure 11: A Gmail screenshot used as counter-document of shady message exchanges between politicians during the election campaign.

The intervention of the US in Brazilian politics was part of the climax of *Time Crisis*. In the story, Dilma Rousseff won the elections due to her digital secretary service proposal, which she implemented soon after her second term started. At a certain point, she saw herself overworked and having trouble with managing time. Similarly to the Gmail fact, Rousseff succumbed to US technology and adopted the AI in her office without letting anyone know. The counterfact came to the public through a WhatsApp audio message leaked in the World of Warcraft game, followed by rumors that the AI was running the country. The repercussions of these counterfacts led the Brazilian population to flood the streets against the President and its assistant, which annoyed the population individually. The protest became known as The User Strike since it involved a 24-hour total boycott of computer use. In parallel, the National Congress investigation found enough proof that the assistant was manipulating Rousseff to favor the US somehow. The assistant decided on behalf of Rousseff to run over the budget law, following the decision pattern of former presidents. This automated decision, together with the new fiscal responsibility Law ruled by the Congress, generated the white coup's legal foundation.

The alternative present contained many counterfacts that are similar to facts announced by the press. However, they presented quantitative differences (like exaggeration) and qualitative differences (like irony) that produced a humorous contrast to reality's sadness.

For example, in the mockumentary, after replacing Dilma Rousseff, Michel Temer did not ban the personal assistant but changed it to implement the labor reform. Some counterfactuals from this story turned out to be similar to facts revealed after the mockumentary production, such as the vital role played by labor reformists in the political articulation behind the coup, the active involvement of FBI agents in the Car Wash corruption investigations that contributed to the impeachment of Rousseff, the crucial role of WhatsApp audio message leaks in raising the public opinion against the politicians targeted by the Car Wash investigation, and the role of street protests in shaping the public opinion.

The students behind *Time Crisis* started from an individual pressure felt among the class and ended up in a recent, yet already historical oppression, felt by an entire nation: digital colonization (Kwet, 2019) or, in a different formulation, data colonialism (Couldry and Mejias, 2018). The technological dependence enables capturing user data and influencing consumer and voter behavior in underdeveloped nations. While focusing on a particular technology — the digital secretary, the movie drew attention to how individual actions mediated by a scalable technology can change the course of a nation's history. Design did not determine these actions; they emerged as responses to the conflicts and dilemmas faced in everyday politics and official politics. Instead of devising a utopian solution to time management, they criticize the technology and highlight the importance of political action to overcome systemic problems, such as The User Strike. Instead of learning how to produce good interaction design according to foreign standards, they learn to be conscious designers who share their history-making privilege to avoid oppression in their nation. In other words, they learnt to handle existential time more responsibly.

In the final course evaluation dialogue, we asked all the students to share their thoughts on dealing with oppression. Their responses suggest they developed a different understanding of their profession:

Student I: Well... it was really hard and very, very... disappointing! You never get out of oppression. Yet it's cool. I really enjoyed the semester, because we stopped to reflect a lot, on things that we didn't even think to be oppressions: the oppressed, the oppressive technology, and everything else. But knowing that we will never be able to leave (oppression relations) in a moment when we are... (inaudible)

Student J: I was talking to (a colleague) yesterday and we came to the conclusion that all oppression starts from capitalism ... [laughs]

Student L: ((jokingly)) Welcome to the club!

Student J: And there's no way to change that... There's no way, dude! Activities remain oppressed in the digital media.

Student I: I wonder if it is possible for humanity to be able to create, to speculate on these things... and create alternatives. Because society comes from this process of creating alternatives, all the time. Why haven't we created an alternative yet?

Teacher B: Right...

Student I: I think about the reflection on what we are experiencing... Other courses tried to bring this reflection to us, but, in that regard, this course, for me at least, it

was one of the best to understand what we are creating, what we are experiencing.

As can be seen from this dialogue fragment, the course was probably successful in demystifying technological solutionism's folly (Morozov, 2013) and the unfulfilled promises of charismatic technologies from developed nations (Ames, 2015). Instead of hoping for a technological fix for societal problems, students develop their handiness and learn that society must change together with their technologies to overcome oppression.

8. Discussion

The design fiction projects described above dealt with existential time in different ways. While *Prosthesis: The Next Level* imagined Curitiba city as a central stage for cutting-edge and ethically-questionable technological development, *Time Crisis* denounced a foreign intervention in Brazilian politics. Both fictions challenged the imperialist domestication of the future (Vieira Pinto, 2005b), eschewing the historical denial of the underdeveloped historicity. In addition to underdevelopment, the films dealt with other kinds of oppression. The first dealt with ableism and homophobia, while the second featured worker exploitation and digital colonialism.

Dealing with oppression in this way has some limitations: a) fueling the dream of the oppressed to become the oppressor, or the student wishing to become a hero or a villain; b) nurturing the fatalism that it is never possible to overcome the oppression, or the student becoming hopeless or apathetic; c) ignoring other oppression relations that are historically intertwined, or the student considering only one perspective over the conflict; and d) underestimating the effects of the domestication of the future in oppressed historicity, or the student thinking to be possible to manipulate existential time at will. Despite all the efforts we made to liberate historicity, we recognize that the stories were still influenced by the domestication of the future, especially in the narrative construction. The projection of the future as a repetition of the past appeared in some scenes. Also, there were quite some imported technologies that worked according to their original designs. The absence of local utopias is an alarming evidence of the impact of colonization and imperialism in the imagination of the young generation and designers in underdeveloped nations. Students had a hard time imagining how to overcome these oppressions through social change, but at least they did not fall prey to alienated and imported techno-fixes while handling existential time.

In previous works we identified how large companies' design fiction promoted the domestication of the future by hiding contradictions under special effects (Gonzatto et al., 2013). In our classes, we reenacted this criticism so that students could look through the shining interfaces. Even after our students managed to produce this kind of criticism, they could not easily create fictions that did not reproduce similar tropes. If we demanded that students create design fiction focused on interfaces with a similar aesthetic to the videos they found in cinema or advertising, the domestication of the future would have been even more prevalent, as it happened in the Hypermedia course. The use of improvised videos to grasp the interaction language and understand its social meanings was key to avoid technological determinism (Van Amstel & Gonzatto, 2018). It is remarkable how the students realized they knew more about their local histories than they thought by using this language

and how they proposed speculations that interfered with their present handiness, remaining *on the ground* while speculating about the past and the future.

Based on their works and the dialogues we had with them, we can say that our students are better prepared to handle existential time in their (future) positions, either in commercial or non-commercial design projects. Most interaction design education inspired by speculative design focuses on the non-commercial — a reality we could not afford given the significantly lower opportunities for working with non-commercial art and science in our nation. A responsible attitude to temporality requires considering multiple courses of time and localized values, intentions, and implications, including the commercial ones. We believe this capability of dealing with commercial and non-commercial interests is essential to perform the deliberative practitioners' role (Foster, 1999) in underdeveloped interaction design.

Speaking of artifacts, the design mockumentary stood out as a viable alternative to design mockups in deliberating about the future of everyday life and dealing responsibly with existential time. The design mockup was initially introduced in participatory design to enable users and designers to enact a future use situation as if the technology in use is already available at the present (Ehn & King, 1992). It is now a central artifact for interaction design students to explore use qualities and learn dealing with digital materials (Löwgren & Stolterman, 2004). Like many other artifacts employed in interaction design, the mockup focuses too much on conjecture and little on conjuncture, leaving the designer for the most alienated from his historicity and possibilities of making history with what is available around. The shift from mockups to mockumentaries suggested by this research is not a matter of preference; it is more about developing student handiness to include historicity as a material quality (Göransdotter, 2020), something that can also be achieved through other artifacts and approaches. In any case, design mockumentaries proved to be a simple way to broaden interaction design education scope to include the typical socio-technical controversies of STS (Venturini, 2010).

Recognizing multiple voices, diverse societies, and various technologies was key to hold these debates. In the debates, technology development was depicted as a result of historical disputes for existence among the various social groups. The dissemination of new technologies generates reactions, resistance, adoption, and rejection. Students could realize in practice that the technologies and the futures they represent are never universal; they are historically bound to specific handiness.

Learning to handle existential time through multi sided debates proved to be a curious and fun way to recover the historicity denied by the domestication of the future. Many personal stories emerged, allowing us to discuss various relationships between design and culture. For example, the technosocial script provoked students to think about qualitative changes in interactions over the decades, such as the historical transformations that affected the various social groups featured. In this sense, we could say that conjunctural artifacts were a valuable resource for producing an aesthetic of the oppressed (Boal, 2006) for speculative design. Works like these use their resources available in their underdeveloped reality to

rethink that same reality. In our case, the resources were the students' bodies, excerpts from videos found online, simple editions, post-production without special effects, and techniques accessible to the student with a cheap smartphone camera. Reproducing mockumentaries' aesthetics from cutouts, DIY, and improvised shoots was easy for us precisely because documentaries already use this kind of material.

The design mockumentary alone cannot lead to the reflection of the existential time and the critical issues that we have pointed out throughout the paper. For example, we had several works not described here, which used mockumentary language and approached speculative design in absolute time. The other conjunctural artifacts were developed precisely because we need to look for ways to work the existential time together with the narrative: in conflicts, in temporal changes (decades), and linear unfoldings of non-linear events. Nevertheless, the primary learning opportunities were created by reflective dialogues between teachers and students, as shown by the debriefing conversation fragments.

We think that conjunctural artifacts are different from counterfactual history (Eriksson & Pargman, 2018) and counterfactual scripts (Huybrechts et al., 2017) because they keep the possible and the actual close together (Vieira Pinto, 2015b, p. 213). While conjecturing about the past or the future, these approaches eventually disjunct the possible from the actual, exploring divergent histories that do not change the *status quo*. Conjunctural artifacts preserve the dialectics between the possible and the real when speculating what would have happened if a past or future existential project had continued to develop any further to what was possible back or forth then — the handiness relationship. While keeping the speculation grounded on local handiness, students developed fictionalization as much as conscientization of their reality (Freire, 1970). Conscientization increased the chances of overcoming oppression by intervening in its material conditions and historical underpinnings. Instead of becoming more conscious of the existence of future artifacts, like in material speculation (Wakkary et al., 2015), students became more conscious of oppressed groups' existence throughout history, an essential contribution of existential time.

We could have brought existential time to interaction design via the existential perspective over HCI (Kaptelinin, 2018), emphasizing individual and subjective relationship to technology. By doing so, we would have extended the previous definition of existential time as a subjective temporality experienced in everyday life through objects that represent something more significant than absolute time: the past, present, and future of a person's or of a community's life (Otto, 2015; Attfield, 2000, p. 217). We preferred to take a dialectical-existential perspective (Vieira Pinto, 2005a; 2005b) over time because we thought this would make more sense in our condition of underdevelopment. In this condition, interaction design contributes mostly to deny the local collective existential projects. To change this unequal relationship, we had to develop a concept that would be useful not just to study users in everyday life, but also to study designers, given that both produce their existences through and through time, eventually one at the expense of the other (Gonzatto, 2018). The concept of existential time stimulates designers to understand collective existential through a

dialectical relationship that considers both quantitative and qualitative changes.

We believe that the dialectical-existential perspective over interaction design, formulated in the condition of underdevelopment, can also shed new light on Human-Computer Interaction for Development (HCI4D)¹⁶. Sambasivan et al. (2009), for example, recommends that HCI researchers question the notion of development based on sociometric indicators that do not correspond to underdeveloped nations' handiness degree and, therefore, that do not contribute to their existential projects. Vieira Pinto (1960; 1973) goes beyond this criticism and challenges traditional notions of development: underdevelopment does not present itself as a limitation but an indication of developmental potential and relative freedom.

By facing the condition of underdevelopment, this research adds to HCI4D, speculative design, and interaction design an outline of the strategy of the domestication of the future, which denies the underdeveloped potential (Vieira Pinto, 2005b). To counter this strategy, underdeveloped interaction design should approach developed technologies with an anthropophagic spirit (Van Amstel & Gonzatto, 2020): having as much appetite for human pasts as for human futures. One must start from its handiness, even if underdeveloped, in order to transform it. Rather than waiting for ideal conditions to speculate about the future, we can develop these underdeveloped futures which already exist. Within these possibilities, we have emphasized qualitative changes in both society and technology for futures that are radically different from the presents.

In underdeveloped nations like those of Latin America, the ghosts of colonization and exploitation haunt existential time and evade radical futures (Stern, 1996). Since it is an oppressed reality (Freire, 1970), transforming this reality requires facing the underdeveloped oppression (Vieira Pinto, 1960a). Should the domestication of the future be contained, the underdeveloped reality opens up to diverse cultural forms of development (Escobar, 2011) and, consequently, pluriversal futures (Escobar, 2018), and even pluriversal politics (Escobar, 2020). From a dialectical-existential perspective, the condition of underdevelopment is more advanced than the condition of development because it is still open to many historical paths.

In our case, this condition of underdevelopment, once recognized and discussed with students, stimulated them to participate in the deliberation of everyday politics (Escobar, 2020; Manzini, 2019; Greenfield, 2017; Lefebvre, 2014), including the discussion about the existential threats offered by oppressive technologies (Benjamin, 2019; Noble, 2018; Eubanks, 2018; Foer, 2017; Greenfield, 2017). While experimenting with this designerly deliberation, they realized how difficult (and liberating) it is to deal with collective existential projects' denial and oppression. Beyond that, they understood that everyday politics shapes and is shaped by traditional politics — similarly to what political scientist Chantal Mouffe (2005) has found about the relationship between politics and the political.

¹⁶ There are power dynamics around the development issue at the micro level, which does not necessarily involve countries and nations. However, from a dialectical-existential perspective, the notion of underdevelopment in nations like Brazil helps to clarify the origin and the limits of its territory, shaped by colonization projects and interventions that affected the entire nation, such as the participation of other nations in coups.

9. Final Remarks

We have conducted a series of design experiments in a studio to teach and localize interaction design in Brazil while countering the domestication of the future strategy associated with imperialism and colonialism. As explained and exemplified, this strategy denies the underdeveloped people's historicity as if they could not develop their futures and needed to import them from other nations. Countering this strategy cannot be achieved solely by creating alternative pasts, presents, or futures; it is necessary to raise the consciousness of the oppressed historicity to handle existential time, the time in which their existence is at stake.

The design experiments found that grounding design fiction on student handiness — their historical and material relating to the world (Vieira Pinto, 1960a) — helps to dismantle the domestication of the future. When developing a specific handiness, the technology of the past (Vieira Pinto, 2005a) becomes the foundation for the technology of the future, instead of constructing it from the technology of nowhere (Suchman, 2002). Students speculated about a historical path that begins with a detour in the local past and extends towards a local future, enabling them to realize their role in making history. These speculations about past and future stand as a demonstration of development's potential in the present. In this way, underdeveloped design fiction is not just a narrative that describes technologies (of the future); they are in themselves technologies (in the present) that interfere in the relationships between different social groups.

The present research adds further evidence that speculative design in underdeveloped nations should not use the same approaches, methods, and artifacts of the developed nations (Van Amstel & Gonzatto, 2020; Gonzatto et al., 2013). Our emphasis on starting from the students' handiness allowed students to liberate historicity that includes their perceptions of the world, not only individually but also collectively. They realized that speculative design and interaction design could contribute to or hamper collective existential projects like the nation. Trained to become deliberative practitioners (Foster, 1999), they learnt to consider multiple social groups, conflicting perspectives, diverse technologies, alternative histories, branched development, and the political aspect of everyday life.

The positive affirmation of our condition of underdevelopment led to the creation of diverse conjunctural artifacts. This plurality of resources created indicates the creative potential of considering historicity as a material quality while handling existential time. Together with the other conjunctural artifacts used, the design mockumentary proved to be interesting to counter the impulse for creating extraordinary technologies disconnected from handiness. These artifacts can be used in other design fiction projects, not necessarily following the same order or intent we had from our handiness. We suggest future studies to improve or to create new conjunctural artifacts to handle existential time by bringing this concept of existential time to test in other *praxis* beyond the educational.

The interpretation of existential time presented in this article is still initial and we recommend new readings of the concept in HCI, interaction design, and speculative design. We believe that the theoretical framework used here, based on the ideas of Álvaro Vieira Pinto, can contribute to politicizing post-phenomenology (Verbeek, 2020), problematizing digital work (Grohmann, 2016), and decolonizing ontological designing (Falcon, 2020;

Tlostanova, 2017; Willis, 2006), discussions that stem, in some way or the other, from the work of Heidegger (1996). Vieira Pinto (2005a, p. 349) emphasized the need to critically scrutinize the work of Heidegger, which contains elitistic and colonial biases against the distribution of technology over the world. The critical view on existentialism can be further extended by Latin American studies of oppression, such as the ones conducted by Paulo Freire (1973) and Augusto Boal (2000; 2006). In their school of thought, existential time is not just something that should be taken into account by design as a dimension to be anticipated or imagined. It is something that design is already producing and, from an ethical stance, it should be produced more consciously and locally grounded to liberate the oppressed historicity.

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