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THE COFFEE MAKER AND THE CYBORG

Exploring percolated subjectivity through students' use of telepresence avatars

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Abstract

This article introduces the concept of percolated subjectivity to explore how telepresence avatars mediate the presence and agency of chronically ill or long-term absent students in educational settings. Using ethnographic and autoethnographic methods, including interviews and observations, the study examines how subjectivity is not simply extended but co-constituted through human-technology-human interactions. Empirical cases from Denmark - such as a class mourning a deceased peer through an offline avatar or a child feeling forgotten when their avatar is left behind - reveal how avatars become sites of emotional, social, and cognitive entanglement - sometimes perceived as subjects or at least quasi-subjects. All cases are from 2023 onward.

Drawing on postphenomenology, new materialism, and poststructuralist theory, the article conceptualizes percolated subjectivity as a process through which human subjectivity seeps into and is reflected by non-human entities. This challenges binaries of presence/absence and human/machine, framing subjectivity as dynamic, shared, and potentially cyborgian. The metaphor of percolation captures this fluid, reciprocal process, offering a nuanced lens for analyzing mediated identity and agency.

The article concludes by suggesting broader applications of the concept in contexts of vulnerability, care, and social inclusion related to technology, including implications for educational practice, technological design, and future research into mediated human experiences - such as gaming or AI-assisted communication.

Plain Language Summary[1]

- This study is relevant for educators, parents, technology designers, and policymakers concerned with how chronically ill students can remain socially and academically connected to school. It examines what happens when children attend class through telepresence robots and how this reshapes ideas of presence, participation, and belonging.
- The research explores how telepresence avatars change the meaning of “being there.” Based on observations and interviews in Danish schools, the study shows that these devices do more than transmit sound and images—they actively shape how absent students and classmates experience connection, recognition, and agency.
- The findings reveal how avatars can become sites of shared emotional engagement. In one case, classmates gathered around a telepresence avatar after a child’s death and enacted a farewell ritual, suggesting that the device carry aspects of the child’s social presence within the class.
- The study also highlights the relational nature of mediated presence. When a student’s avatar was accidentally left behind in the schoolyard, the student experienced this as being forgotten. The episode demonstrates how participation through technology depends on ongoing recognition and collective responsibility.

[1] AI-generated; author checked and approved.

- The article introduces the concept of “percolated subjectivity.” This concept describes how human subjectivity both shapes and is shaped by technological objects through interaction. Rather than being transferred to the machine, subjectivity emerges relationally through human–technology entanglements.
- The findings contribute a conceptual framework for analyzing technologically mediated inclusion. The article offers a nuanced lens for understanding how identity and agency are dynamically negotiated through telepresence technologies, with implications for educational practice and future research on mediated human experiences.

1 INTRODUCTION

Telepresence technologies are used to provide schooling for long-term or chronically ill children and reduce extended school non-attendance. But what really occurs when such technologies are applied, and how might we explore and develop concepts that enable greater insight into these intricate, heterogeneous processes? What imaginary connections occur with the technology as a pathway? Do such technologies act as an extension or even an expansion of the child's subjectivity in the classroom? Or does such usage necessitate other notions of subjects? These are just some of the questions arising from engagement with telepresence technologies, or avatars, as I call them.

To seek answers, this article brings together two highly complex and heterogeneous fields: the field of human–robot interactions (HRI) and the field of school absenteeism. To engage with the field of human–robot interactions (and intra-actions, to draw on Karen Barad), it has proven helpful to combine postphenomenology and new materialism while maintaining a poststructural basis (Andersen, 2024). Bringing these theoretical perspectives together allows analytical access to the complex entanglements that emerge in the reciprocal process of subject formation while also enabling a freezing of certain states of mediation and subjectivity. Consequently, much of the same theoretical apparatus is relevant when engaging in the complex and heterogeneous field of school absenteeism (See: Knage, 2021; 2023). The ambition, ultimately, is to better engage with(in) research fields involving virtual and technological materialities. Previous studies have in particular explored cases involving children with chronic illness (See: Andersen, 2024; Newhart, 2018; Turner et al., 2022; Weibel, Skoubo et al., 2023). However, it is a complex field full of different actors, political agendas, and contradictions, leaving many areas still underexplored.

In this article, I will examine these complex phenomena through equally complex methodologies. This means that different methodologies of a primarily ethnographic (and autoethnographic) or at least exploratory origin were employed to gain a better view of the field of study[2]. In order to develop the best possible approach for studying the heterogeneous phenomena, I follow the advice of John Law (2004), who argued that a messy field calls for equally messy methods. I therefore place great emphasis on the relevance of employing multifaceted research methods to allow analysis of emerging phenomena and experiences of how telepresence avatars interact with(in) the everyday lives of both absentee children and their classmates. This furthermore provides the backdrop for the development of the new concept, percolated subjectivity, through empirical analysis that can ultimately allow a better understanding of what occurs when humans engage with other humans through and with technology. Percolated subjectivity describes the way human subjectivity temporarily shapes and is shaped by non-human entities, such that both humans and objects are mutually transformed through specific interactions. Cyborgs will not be an all-encompassing theme in this article, as the title might indicate. Rather, the notion of cyborg as a fluid concept implying hybrid connections across organic and synthetic parts (Haraway, 2016a; Shew & Earle, 2024) serves as a foundation, incorporating not only technological integration but also social, cultural, and philosophical implications for identity and agency. Consequently, I only refer to the processual connection between human and avatar as cyborgian, never cyborg, thereby rejecting conventional dualisms.

[2] In this context, ethnography does not refer to the traditional anthropological practice of long-term, immersive fieldwork aimed at producing a holistic cultural account. Rather, it is used in the more flexible, philosophically informed sense often found in postphenomenological and poststructuralist research (e.g. Kudina & Verbeek, 2019; Søndergaard, 2013), where ethnographic sensibilities - attention to situated practices, lived experience, and relational meaning-making - are applied in exploratory and reflexive ways without adhering to the stringency of classical ethnography.

To further clarify, I will conduct exploratory conceptual development based on readings of divergent theoretical perspectives and empirical examples. The apparent seeping of qualities from human subjects to non-human objects specifically leads to perspectives on what I coin percolated subjectivity, a concept that I elaborate on below.

1.1 TELEPRESENCE

There is no clear theoretical consensus on how to define telepresence, with debates ongoing (Fletcher et al., 2023). For the purpose of this article, however, telepresence can be briefly defined as technologies that allow users auditory, visual, and virtual material participation in a remote context. In other words, telepresence is a physical material vessel controlled by a physically absent human. Such technology allows the user to be virtually present in school through the physical presence of an avatar. Telepresence technologies range from small robomorph (i.e., they look like "a robot") artifacts, such as the AV1 or the OriHime, to screens-on-wheels like the small Fable Connect or the human-height Beam robot.

AV1, by No Isolation. (https://ndla.no/image/52535?)

OriHime, by Ory Laboratory (https://orylab.com/wp-content/uploads/6.jpg)

Fable Connect, by Shape Robotics (https://shaperobotics.com/en/fable/)

Beam, by GoBe robots (https://gobe.blue-ocean-robotics.com/beam-to-gobe)

Figure 1: Examples of popular telepresence avatars

There are other iterations of telepresence technologies that are not mentioned here, but most either share elements with one of the four examples mentioned above (which are also the most widely used technologies in Nordic classrooms) or are not relevant in an educational context. The AV1 and the OriHime do not provide a two-way video connection to the remote setting. This means that the user is not visible to those in the classroom, but the classroom is visible to the user. The Fable Connect allows both two-way and one-way video connections, while the Beam only provides a two-way video connection (For more of an in-depth exploration of the material make-up of the robots see: Andersen, 2024; Turner et al., 2022). I primarily use the term *avatar* when dealing with the technologies. This is to underline representation as a key capacity of telepresence technologies. Less frequently, I use the term *robot*, but only in reference to empirical material where users employ this term. The concept of avatars has several readings; from solely virtual representational avatars, over physical examples of representational technology, to philosophical reworkings of concepts from pop culture. Many scholars have previously engaged in discussions of the concept's limitations and possibilities (e.g. Boellstorff, 2011; Chimirri et al., 2018; Schultze & Leahy, 2009). Such discussions are highly relevant; however, in the current paper, I step back from these more elaborate theoretical debates and instead employ the notion of the avatar in a rudimentary and exploratory sense, as a conceptual lens that enables attention to how subjectivity, mediation, and presence become entangled in specific, situated practices.

1.2 THE VIRTUAL

It is important to note here that I employ the concept of *virtual*, specifically in relation to the absent participant's connection to the classroom. *Virtual,* in this sense, is not a reference to a Deleuzian or Merleau-Pontyan construct but to the immersion that seemingly occurs when a

virtual presence is experienced by users of telepresence avatars. *Virtual* is thus used to differentiate from material physical presence, while maintaining the possibility of such a physical materiality co-constituting a virtual materiality (and vice versa). Consequently, I do not employ its counterpart *digital* in relation to such participation, as that would imply a less qualitative and more data-driven instrumentalization of electronic means (Merriam-Webster, n.d.) related to the device itself rather than the connection between device and human. *Digital* is therefore not applicable here, mainly due to a primary focus on heterogeneity. Without delving too far into a definitional discussion, one issue with *virtual* as a term, however, is that it naturally follows a second-order logic. Something (often *the real*) will always come first, be more correct, or the origin of the virtual, which is thus second order. I do not adhere to this logic in the following, instead opposing such a binary dichotomy in relation to the virtual and the real. This also means that mediation is not in contrast to the virtual. Rather, virtual presence (such as when the student views his/her school life through a screen) simply adds more specificity to mediation and related processes. Within such a frame, *digital* would describe the on-screen platform that the student engages with (it *is* digital), while *virtual* would describe the experienced phenomenon of an in-between state, which is of greater interest in the context of this article.

2 SUBJECTIVITY POST-MORTEM (A BRIEF LOOK AT THE PHENOMENON)

To illustrate some of the questions the empirical material invites us to ask, I will begin with a rather tragic empirical example produced by employing ethnographic methodological elements that will be presented below. The example is related to a different research project focusing on implementations of telepresence avatars for children suffering from cancer (See: Weibel et al., 2020; 2022; Weibel, Bergdahl et al., 2023; Weibel, Skoubo et al., 2023). This empirical case became part of my research material through conversations with the primary researchers, one of whom had the experience outlined in the following. A year later, the conversation and its saturated meaning stuck with me. I therefore arranged a phone interview with the researcher, recording and transcribing our conversation. This led to the following short case description:

> A child suffering from cancer had sadly passed away. Several weeks later, a researcher visited the now-deceased child's class to pick up the telepresence avatar. While she was there, the entire class, former classmates of the user, gathered around the avatar, touching it and saying some last words as it was placed in its box (the box it was shipped in). When the researcher picked up the box, the children followed her out of the classroom, as if they were pallbearers at a funeral, sporadically touching the box, saying their farewells.

Though tragic, the example unmistakably points to a reaction to a body with subjective qualities - a body that is obviously not the deceased child, but nor is it entirely ("only") the telepresence avatar. This poses the questions: "What does such a body become?" and "Were the classmates engaging with a non-human or a mediated subject?". If we are to address such questions, there may be a need for new conceptualizations of subjectivity. The researcher's experience illustrates a subjective in-between state that might be due to a gradual seeping and filtration of subjectivity from the user to the avatar - a process of percolation, as I will later argue. The students' engagement with the avatar in this example might therefore be a prime example of what I will coin as *percolated subjectivity* throughout my material. As a concept, and as I will later show, *percolated subjectivity* refers to the temporary, relational shaping of human and non-human actors through their entangled interactions. In this process, human subjectivity "percolates" into objects, technologies, or other entities, leaving them momentarily imbued with aspects of human perspective or intentionality, while the human simultaneously

experiences shifts in self-perception through engagement with or through these altered entities. With this concept, I will highlight how subjectivity is not fixed within individuals but emerges dynamically in encounters, mediated by material, technological, and social conditions. An ethnographically inspired approach allows a broader analytical and empirical focus that might be especially relevant when developing metaphors that can help us better understand such relatively uncharted contexts.

In the following, I will address the wider theoretical, methodological, and empirical basis for the current article, before re-engaging with the example above to explore the boundaries and potentials of the metaphor of percolated subjectivity. I will then provide greater nuance using additional empirical examples, thus furthering the analysis of processes of becoming based on other experiences with and through telepresence avatars.

3 METHODS

The analysis is based on qualitative methodologies involving observations, interviews, and content analysis. These methods were further informed by autoethnographic elements, including personal narratives, anecdotes, and experiences from the field. Participatory observations were conducted at Danish schools, primarily in classrooms but also in meeting rooms where counsellors, teachers, parents, and students were present. These observations primarily focused on engagement of and with the telepresence avatar, how classmates interacted with the student at home, and, conversely, how the student at home was (and could be) experienced in the classroom. Both interviews and observations were conducted either at/in schools or at the home addresses of the absent students.

I conducted interviews with teachers, parents, and the absent students both before and after observations. Initial interviews aimed to explore and gain an understanding of the phenomena. In total, I conducted interviews with 16 participants. Absent students in primary or secondary school were primarily interviewed with a parent [n=8], classmates in a focus group [n=4], while one participant was interviewed via a video-conference system [n=1], and two further participants were interviewed in person: an adult university student and her mother [n=2]. Lastly, I conducted one phone interview with the aforementioned researcher [n=1].

Embedded in the interviews were ethnographic elements, both to establish a rapport and to get a sense of the spaces and bodies inhabited by the participants (Spradley, 1979). This meant that I asked initial questions such as: “Could you tell me about your typical school day?” or, more broadly: “Please tell me a little bit about yourself, what is something I ought to know about you?” This was the case for all the interviews, except for the interview with the researcher. This approach was also chosen to acknowledge that clean-looking accounts of research methods (as Law (2004) states) are often an allegorical screen door concealing a rougher and more irregular knowledge production process. Such questions also allowed exploration of experiences of “being,” which are central to my inquiry. Specifically, I asked students and their parents about their experiences of presence, absence, and participation through telepresence avatars, sometimes (but not always) related to their physical material presence. Questions focused on “when” and “why” they felt particularly present, and how they would describe such experiences. Such questions were juxtaposed with questions concerning experiences of absence (while present through the avatar).

I employ ethnography as a way of underpinning the analysis of the entire body of empirical material, and to better situate questions asked during interviews or observations made in situ. However, as can be seen in the example above, I also employ specific anecdotal evidence provided by other researchers as empirical material. Such material initially emerged through auto-ethnography and was later explored through further conversations or interviews with the source of quotes or actions (as is the case above). Additionally, auto-ethnography was employed

through my own experiences with telepresence technologies in a professional context, as both No Isolation (the producers of the AV1) and Shape Robotics (Fable Connect) graciously allowed me to borrow their products - some of these experiences will be presented as empirical elements later in this article. As Law (2004, pp. 18-19) states:

> "(…) ethnography lets us see the relative messiness of practice. It looks behind the official accounts of method (which are often clean and reassuring) to try to understand the often ragged ways in which knowledge is produced in research."

In the following, I will not engage in a discussion of the merits and weaknesses of qualitative enquiries within the social sciences and efforts to embed scientific rigor attributed to the natural sciences within such a framework. Many have previously made such comparisons (and far better than I ever could) and problematized the notion of the world *being* discoverable in any ontological sense (e.g.: Barad, 2007; Derrida, 1993/2006; Haraway, 2016b). I will, however, stand on the shoulders of such reflections, pursuing "(…) methodological efforts to make and know limited moments in the fluxes that make up reality." (Law, 2004, p. 9). Law suggests that explorations of the ephemeral, messy, and irregular might draw upon a parallel "messiness" in their methodological approaches. I employ ethnography as a methodological concept, in line with other postphenomenologists, poststructuralists, and STS scholars before me (e.g. Kudina & Verbeek, 2019; Søndergaard, 2013). Here, "ethnographic" denotes a close, situated attentiveness to lived experience, technological mediation, and the enactment of subjectivity in context, rather than full-scale field immersion as can be the case with anthropological study. In this sense, ethnography borrows from but transforms anthropological traditions, thus becoming a way to trace meaning-making and positioning rather than culture (Søndergaard, 2002). Combined with Law's original work, I argue throughout this article that such notions constitute substantive, even necessary additions when dealing with the heterogeneous fields of absenteeism and interaction - especially human-to-human interactions mediated by technology (with telepresence avatars as the main case). Thus, though at its core relatively mundane, the methodology is heavily inspired by notions of grasping a messy field of study through an equally messy methodological approach.

All of the empirical material has been produced in a Danish context from 2023 until, and including, 2025. All participants were pseudonymized during transcription, and all quotes have been translated from Danish. Technological means, such as which telepresence avatars are represented, were defined by the empirical field and were limited to the AV1 telepresence robots and the Fable Connect. These technologies are generally popular choices and represent the vast majority of use cases in Denmark, Norway, and Sweden (Turner et al., 2022). Demographic categories such as gender, sex, sexuality, cultural heritage, and ethnicity were represented as widely as possible, but limited by the target group. The predominant selection criterion was therefore simply absenteeism from school settings.

4 THEORY

In this article, I stand on the shoulders of poststructural, new materialist, and postphenomenological theoretical perspectives (Aagaard et al., 2018, Barad, 2007; Butler, 1993; Søndergaard, 2013;). I have previously explored diffractive readings of such perspectives (Andersen, 2024), which I will resituate in the current article while arguing for their usefulness when engaging empirically with human–technology–human interactions. Such an approach entails engagement with different ontological positions, while combining specific conceptual elements.

4.1 POSTSTRUCTURAL AND NEW MATERIALIST FOUNDATIONS

When developing a concept for bettering understanding of human engagement through and with technology, it seems highly relevant to seek inspiration in poststructural and posthuman notions of subjectivity. Poststructuralist and feminist theories from the 1980s onwards, and notably in the 1990s and 2000s, transformed standard methodological practices, particularly in qualitative research with children. Bronwyn Davies (2003) played a pivotal role in this shift, advocating for engaging with children through direct interactions that validate their experiences. This approach is now more commonplace when studying social entanglements and emergent selves. Davies (2003) emphasizes moving beyond traditional views of children as passive subjects, instead recognizing them as active and creative participants in social and linguistic contexts. This has greatly influenced the methodology shaping this article. Judith Butler (1997; 1993) is another source of inspiration, underscoring how subjects are constructed through language and social norms, in this case, the emergence of children's experiences with avatars. To the current paper, Butler and Davies' attention to how subjects and worlds are co-constituted through language, affect, and practice provides a framework for exploring how subjectivity might percolate into objects through these same relational processes. Rosi Braidotti (2011; 2018; 2019) extends such perspectives through her conceptualization of subjects, both human and non-human, as nomadic and constantly evolving through material and technological interactions. This perspective challenges static notions of identity and emphasizes the dynamic, relational nature of subjectivity in digital contexts. Central to the conceptual development at the heart of this paper is the idea of subjectivity as a relational, processual, and transindividual phenomenon; never fixed within the human, but continually becoming through affective flows among bodies, technologies, and environments. Braidotti's notion of the nomadic subject offers a way to understand subjectivity as also capable of moving across boundaries and inhabiting the non-human, temporarily enlivening objects or systems with traces of human agency. Braidotti's concepts further bridge a gap towards new materialist perspectives. Beyond Braidotti's readings, new materialism provides a framework that enables theoretical insights from all perspectives to be read through and with one another. This aligns with Karen Barad's (2014) reading and development of the concept of diffraction, which operates across practical analysis, theoretical formulation, and research methodology.

Diffraction, as used in the social sciences, emphasizes patterns of differences and interferences rather than linear cause-and-effect relationships (Barad, 2007; Davies, 2021; Geerts & van der Tuin, 2021). Another key concept applied in the current work is intra-action, which challenges the idea of independent subjects or objects, proposing instead that entities co-constitute one another through entanglement (Barad, 2007; Søndergaard, 2013). Here, agency is not possessed by individuals but emerges as the capacity of material entities (human subjects, objects, technologies, environments, etc.) to relationally co-constitute social and cultural processes within material-discursive phenomena (Rasmussen & Søndergaard, 2020). Applying the concepts of agency and intra-action to the study of telepresence avatars allows empirical exploration of how human users, avatars, and environments are contingent on and shape one another, potentially producing new forms of agency, identity, and spatial relationships. Intra-action reveals the avatars' co-constituent role in blurring human–technology boundaries, paving the way for interpretations of the human–machine organisms or cyborgs that may occur (Haraway, 2016a). Drawing from Donna Haraway and Trinh Minh-ha's readings, diffraction further allows empirical engagement by tracing how phenomena emerge through relational entanglements (Geerts & van der Tuin, 2021; Haraway, 2016b; Minh-ha, 1988/1997).

4.2 POSTPHENOMENOLOGY AND TECHNOLOGICAL MEDIATION

Additionally, new materialism can be read diffractively through a postphenomenological lens that informs both methodology and analysis (Andersen, 2024). Like new materialism, postphenomenology explores the co-constitutive relationship between humans and technology,

emphasizing how meanings emerge through this interplay. While adjacent to posthumanism, postphenomenology does not entirely dissolve distinctions between human and non-human agencies, as seen in Braidotti (2018; 2019) and Barad (2007), but shares a commitment to moving beyond anthropocentrism. By merging phenomenology and American pragmatism, postphenomenologists highlight how technologies mediate human perception and interactions with the world (Aagaard et al., 2018; Ihde, 2016; Rosenberger, 2018; Rosenberger & Verbeek, 2015). Technological mediation is a key concept in this regard, examining how technologies actively shape human agency while also being reinterpreted through their use. The argument is that technologies do not function as neutral tools but mediate human experiences and practices (Ihde, 2001; Verbeek, 2015). Agency here, though still human-focused and thus not as broad as in new materialism, concerns how technologies actively shape human experience, perception, and action. This resonates with the concept of intra-action, as both frameworks engage with how telepresence avatars influence perception, agency, and relational dynamics within virtual and remote environments. With the emphasis on human agency, mediation might allow for focused perspectives as a point of departure, even as such a point would likely be deemed far too simplistic by new materialists. The different perspectives come to matter, however, as they allow the same phenomena to be studied through different lenses, potentially enabling richer analysis (hence the argument for active theoretical diffraction).

Postphenomenologists like Robert Rosenberger and Peter-Paul Verbeek further argue that technologies take on multiple meanings or *stabilities*, shifting based on context, user perspective, and situational demands (de Boer, 2021; Rosenberger, 2018; Rosenberger & Verbeek, 2015; Verbeek, 2015). As Rosenberger (2020) notes, technologies remain open to reinterpretation and adaptation, yet are always constrained by their materiality. Telepresence avatars exemplify this fluidity, functioning as an assistive tool, embodied extension, surveillance mechanism, or disruptive presence, depending on their use (and are not limited to either interpretation). These shifting stabilities suggest a potential in a diffractive reading of postphenomenology alongside intra-action, emphasizing how technological entanglements unfold in everyday contexts.

From a postphenomenological standpoint, such entanglements foreground the co-constitution of humans and technologies in what Ihde (1990) describes as human-technology relations, where meaning emerges through mediation rather than pre-existing intention. Technologies are thus not neutral intermediaries but active participants in shaping perception, practice, and subjectivity. Verbeek (2015) extends this by highlighting how technologies mediate moral and existential dimensions of human life - transforming what it means to act, decide, and even to be in relation to others. Reading these insights diffractively through Barad's notion of intra-action and into the empirical material involving telepresence avatars allows for a deepened understanding of how technological mediation is never merely representational but ontologically generative, continually reconfiguring the boundaries between human and non-human agency. As I will attempt at conveying, this combined lens positions telepresence avatars, and similar sociotechnical assemblages, as sites where subjectivity and materiality might mutually percolate, producing new possibilities for being-with and sensing-through technology.

Below, I engage with empirical cases from throughout my work and employ diffraction as a lens, allowing for potentially richer understandings of what occurs within and across the phenomena. The encounter with empirical material both expands and unsettles the concepts outlined above, while simultaneously supporting the development of the idea of percolated subjectivity as a conceptual metaphor for the dynamic processes unfolding in human–technology–human interactions. Ultimately, these concepts serve as generative companions that enable a deeper engagement with the complexities of the phenomena. I stand on the shoulders of these

concepts, using them to gain a vantage point from which the phenomena may be more richly understood. However, we must first explore the central notions of “subjects” and “subjectivity”.

4.3 WHERE THIS LEAVES THE SUBJECT AND SUBJECTIVITY

Based on the theoretical insights presented above, the notion of a *subject* is applied to underline a relational and dynamic construct that emerges through material practices. When encountering such a construct, specific challenges occur as it is not fixed nor autonomous but rather shaped by intra-actions (Barad, 2007), embodied and fluid in multiple stabilities (Braidotti, 2019; Rosenberger, 2018), discursively positioned and subjected (Davies, 2003; 2021), and iteratively performed through acts (Butler, 1993; 1997). Thus, the subject emerges as a continually reconfigured and not-necessarily human entity. Non-human entities might, by virtue of their entanglements, be “subjected.” However, such subject positions are never fixed but part of an ongoing performative process of becoming. This further means that there is an active, reciprocal connection between the avatar and the human(s) - a connection where subjectivity is in fluid motion. This is what allows subjectivity, at least momentarily, to be possessed by non-human entities, which is also why we need the concepts outlined above.

It might therefore become important to ask: To whom is something a subject? Such a question might go beyond the scope of mediation when technologies are carriers of subjectivity, but that is not always the case, as they are multistable (Rosenberger, 2020). It might be answered by intra-acting agencies, but when the presence is clearly mediated and non-transparent, such conceptual metaphors are insufficient. When technologies mediate and intra-act while simultaneously possessing and not possessing subjectivity (as I will show), and while being multistable (i.e., being a single entity with multiple potential simultaneous enactments), a new metaphor is needed to deal with such cases analytically. We need concepts that stand on the shoulders of both posthuman and postphenomenological perspectives. Such a metaphor is not a panacea; it is an addition, contingent on the other concepts in its formation and application. Percolation might sound strange at first, with a coffee maker perhaps the first example that comes to mind. However, it is the process of percolation rather than the end product in the form of coffee that is the point of this metaphor. As I will argue below, such a process includes the passing of qualities from one substance to another, which is the key to the metaphor’s relevance.

Subjectivity might consequently become an emergent, relational, and mediated phenomenon, constantly shaped by material entanglements. Simply put, this renders subjectivity as neither purely human nor purely discursive, but an entanglement of enacted forces. Subjectivity is continuously reconfigured through interactions, intra-actions, and positionings. It is not fixed or inherent, but fluid, relational, and responsive to its environment. Finally, as I will explore in the analysis, it is shareable, but seemingly still contingent on some proximity to human subjectivity.

5 ANALYSIS

The following analysis emerged as (and through) a process of reading and listening through the research material. Analytical attention was placed on individual empirical sections, where meaning emerged by engaging with and reading such sections from primarily posthuman theoretical perspectives. However, the analytical process was still greatly informed by my own involvement with the subject matter—as memories, experiences, auditory cues, and socio-cultural understandings, all entangled with(in) the apparatus of analysis. In line with posthuman and especially new materialist perspectives, I sought to genuinely engage with all available material, in an attempt to stay with the trouble, in the sense highlighted by Haraway (2016b). First, however, I will present the concept of percolation as a gateway to the analytical perspectives emerging from it.

5.1 PERCOLATED SUBJECTIVITY

With percolated subjectivity, I attempt to introduce an analytical concept that stands on the shoulders of established theories of agency, intra-action, mediation, and entanglement, while maintaining a processual focus on the phenomena. I hereby intend to offer a novel lens that might be applied to address gaps in our existing conceptual vocabulary and the analysis such a lens enables. Such gaps specifically relate to processual elements where subjects interweave reciprocally, rather than emerge as singular individuals. Concepts such as mediation, agency, and intra-action are foundational for our understanding of human–human, human–cyborg and human–object relations, but with human–object–human relations, certain nuances of the temporary and transformative state of subjectivity are potentially missing (Søndergaard, 2021). But why is a new concept necessary? In the following, I will attempt to answer this question through empirical examples.

Percolation, as both a natural and artificially induced phenomenon, refers to the movement and filtering of fluids through porous material(s) (Blanchfield, 2011, p. 1255). As a theoretical concept, it is almost 70 years old (Broadbent & Hammersley, 1957) and has been widely used in mathematics, chemistry, and physics. One of the perhaps best-known and simplest processes of percolation is the production of coffee, where the water slowly runs through coffee grounds. While percolation is the process of liquids running through solids, it might also describe the movement or diffusion of substances through interconnected spaces or media. This can involve different percolation apparatuses or percolators. A coffee percolator is a specific technology that circulates water through coffee grounds over and over, allowing the grounds to imprint themselves on the water, but a regular drip coffee maker is also an example of a percolation apparatus; a household water filter might be another. This emphasis on movement, diffusion, and temporary saturation resonates with a process-oriented vocabulary, foregrounding becoming over being. Percolation does not describe a completed transfer or a stable outcome, but rather a continual negotiation; an uneven and momentary inhabiting of one form by another.

It is important to underline again that the concept is complementary and is still contingent on the diffractive reading and application of technological mediation, intra-action, and agency (Andersen, 2024). Neither is it a reference to the product at either end of the process or the properties themselves, but rather the process itself; an ongoing movement through which subjectivity emerges, seeps, and temporarily takes form within relational entanglements between humans and technologies. Whereas mediation often positions objects as receivers of influence or as rather active mediators of relationships, percolation introduces a more subtle and entangled interplay. It suggests that subjectivity permeates from the human user through virtual and physical objects (i.e., the interaction with a digital platform and the physical avatar), allowing them to momentarily borrow and reflect human subjectivity. This could be the case when classmates say farewell to a now deceased friend through an avatar that is no longer inhabited by the subject. On the surface, such engagement might be no different than that highlighted by prior studies of anthropomorphism and personification of objects (e.g.: Festerling & Siraj, 2021; Pradhan et al., 2019). It might also be quite similar to Don Ihde's concept of alterity relations, where technologies seem to gain their own presence as we directly interact with them, almost as though they are an independent "other" (or quasi-other, as Ihde termed it) (Ihde, 2001). Meanwhile, the first obvious (but also banal) difference is that a telepresence avatar has an existing or previous connection to a human subject. But how does that come to matter? How does this connection affect the relationship between humans and technology?

In the following, I argue that the perceptions of human subjects across usage (classmates, teachers, and parents, as well as the user) transform the object; the telepresence avatar - not just the perceptions of it, rendering it a temporary site of subjectivity, however fleeting or enduring. I will try to exemplify this through further empirical examples. To resituate the case

example from earlier, in the following passage, the researcher describes how the previously outlined situation began, as she prepared to leave the class after a debriefing with the students, the teacher, and the parents of the deceased child:

> I was about to pack up the robot and place it in a plastic bag, and then all of the children huddled together around me, around this robot. And I thought: something's happening here, I can't just put it into a plastic bag. They had seen this child through the robot, so they were used to him being there, through the robot.

The object seemed to function not only as a mediator, but as a carrier (at least temporarily) of a shared subjectivity that moved beyond temporary, static roles towards dynamic exchanges with other subjects, where the technology, in some cases, is intra-acted with as a subject rather than an object. In the earlier empirical excerpt, percolation might explain how the experience of an almost human agency and subjectivity is experienced by the deceased child's classmates. The classmates seemed to engage with the deceased child as they held a spontaneous funeral procession, but were obviously aware that what they were engaging with was, in fact, a mere representation. Nevertheless, this specific representation seemed to be close enough to merit a highly emotional commitment to an object made up of plastic and wires. Whether through imaginaries, representation, or enactment, the deceased child was simultaneously both present and absent due to mediative intra-actions with the avatar and the percolation of post-mortem subjectivity.

Barad's (2007) concept of intra-action primarily addresses how human (and non-human) entities co-constitute each other within phenomena, which in turn erases the subject–object dichotomy. With percolation, however, we might add an additional layer concerning how technologies come to echo human subjectivity back to the world, but rather than a technological subjectivity, this is a percolated subjectivity, thus transforming the enactment of the object and/or the subject.

The researcher from earlier described her exit from the school as follows: "I simply had a funeral procession all the way out [of the school] (…) Like when you follow the coffin out to the hearse". The now deceased child's former classmates seemed to seek a form of ritually founded catharsis through intra-actions with an object that was clearly physically distinct from the child but not emotionally or subjectively distinct. Such catharsis through engagement with objects is not a novel phenomenon—post-mortem rituals across many cultures involve such engagement. What makes this case especially poignant and makes the concept of percolation relevant is that the agency and subjectivity between the avatar and child are shared. The agency takes its point of departure from the child but is not inherently 'of' the child nor 'of' the avatar, but of both simultaneously. The subjectivity, originating from the child as a subject, is altered through the process of percolation, rendering it different (if only slightly) as it comes to be possessed by the avatar. Thus, the concept of percolation might be a stepping stone towards ways of thinking about subjects and objects within technologically mediated relations between humans. It is less about the end product and more about the process of percolation. Intra-action alone is too all-encompassing, not allowing for sufficient distinction, while mediation is too compartmentalized. By using the metaphor of percolation, we might therefore be better able to not only understand individual entities but also the interweaving that occurs across entities.

As a concept, percolation is ascribed some of the qualities inherent in Nancy Tuana's (2008) concept of viscous porosity, where boundaries between entities, such as individuals and environments, are not fixed but permeable and malleable. With this concept, Tuana emphasizes the co-constitution of environmental, social, and material forces. However, although such a concept adds certain nuances to notions of agency, it has previously been criticized for lacking processes of subjectivity (Højgaard & Søndergaard, 2011) and, as I argue here, subjectivity that travels across bodies, subjects, and objects. Here, viscosity relates to how (much) social and

material forces influence and mediate processes of becoming. The metaphor of percolation, and percolated subjectivity, is thus a means of shedding light on more specific entanglements of subjectivity and agency. In the following, I will provide further empirical examples to challenge and further clarify percolated subjectivity.

5.2 FORGETTING LUKAS

The following example might add greater nuance to the concept. In this example, the participant, Lukas, is using the AV1 avatar to participate in activities outside in the schoolyard. After being placed on a table to better be able to see what his classmates are doing, Lukas is forgotten when the teacher and classmates return to the classroom. Recalling such episodes, Lukas's mother says:

> [Mother]: We completely skipped some lessons. Because sometimes they also brought you along and then forgot you.
>
> [Mother]: Then you'd just be standing down there in the schoolyard. "Hellooo!" you'd call out from the robot. Then they'd all run up to the classroom without the robot.
>
> [Interviewer]: Okay [smiles]. Would you mind sharing that episode from your perspective as well?
>
> [Lukas]: We were supposed to go out and learn a kind of dance. I couldn't learn the dance, of course, but they [his classmates] did.
>
> And then my teacher had his back to the robot. And I just think that my class was so busy hurrying inside after [the bell rang]. And so, they completely forgot about me.
>
> And John [teacher], he couldn't see me. No. So he just went... went with them. And then I stood there.
>
> [Interviewer]: And for how long were you left there?
>
> [Lukas]: I don't know. 10-7 minutes.

Later in the interview, Lukas's mother elaborated on how they solved the issue:

> [Mother]: I think that was when I had to write, I don't have John's number [so she wrote to a different teacher]: "They've forgotten Lukas down by the trash can!" And then she immediately calls me back, completely frantic [uses hand as a phone]: "Are you at home? Is he standing down by the garbage can?"
>
> [Mother]: "Oh no, no, it's just the robot". Oh, she thought [laughter]. She thought they had left Lukas down by the trash can. But no, it was just the robot.
>
> [Lukas]: But, Mom, that's because it's me that is inside it [the robot].

This example shows the limited, but nonetheless existing, agency enabled by the avatar. The juxtaposition of the avatar as "being" Lukas, as shown in the above passage, while also being something that is easily forgotten, is an example of what occurs when subjectivity is percolated through the mediative action of engaging with(in) the avatar. It entails a certain joining of human and technology. As such, Lukas's agency was both enabled and limited by the avatar - through the entanglements of and with the other intra-acting agencies of classmates and teachers - but also potentially by subjective notions of what students are and can be. Lukas's human subjectivity was not transferred to the robot but percolated through it, temporarily saturating it, rendering it almost, yet still not quite, human. The robot stood near the trash cans, and yet, from the perspective of the child and those attuned to this entangled situation, Lukas and the avatar emerged in a cyborgian sense as a boundary-blurring being (Haraway, 2016a), a

fusion of a human-machine organism. Cyborgian is here understood cognitively, with cognition, identity, and emotions comprising the organic matter that is entangled with the synthetic components of Lukas's avatar. This further underlines the notion that cyborgs are not merely physical augmentations but represent a broader spectrum of interactions where technology becomes an integral part of human identity and experience (Shew & Earle, 2024).

Though happy with the avatar (or "robot" as Lukas referred to it), its limitations became especially apparent when the cyborgian experiences and expectations of being present were contrasted with being subjected by classmates and teachers as something easily forgotten. The process of subjectification in this empirical excerpt is both interesting and paradoxical. On the one hand, it allows experiences of being acknowledged as a subject; at the same time, however, it limits the same subject to social norms, meanings, power, and thus demarcates mattering (Butler, 1997; 1993). Through percolation, the process of subjectification was contingent on the emergence of Lukas's and the avatar's subjective becoming(s), which occurred jointly, completely entangled in the intra-actions in the apparatus, and the agencies it instilled. These becomings echo Haraway's (2016a) cyborg ontology, where boundaries between human and machine blur, and subjectivity emerges not as fixed or individual, but as a hybrid formation. For Haraway, the agencies instilled through the apparatus do not belong to discrete entities, but to a cyborgian meshwork of human–machine discursive co-constitution. The telepresence avatar mediated the intra-actions, thereby itself becoming an actor, by way of the subjectivity that was percolated through it, residualizing in the process.

The example further exemplifies the multiple stabilities of technology, and consequently, who attributes technologies with subjectivity. For Lukas, "he" was inside the robot, yet there seemed to be a distinct difference in how his classmates and the teacher perceived it, allowing them to forget - not Lukas (although he experienced it as such), but the avatar. Distinguishing between the avatar and Lucas elicited relief from the teacher contacted by Lukas's mother, which was juxtaposed with Lukas's experience of *being* that same technology. The avatar and Lukas were subjectively entangled, cyborgian; they emerged from one another and yet were distinct in subtle ways. Thus, percolation might be a useful metaphor, not only due to the implied filtration, but also the environmental factors that affect the process of percolation.

Such practical influence can also be found in theories on mediation. Cathrine Hasse (2015, p. 281) has described how:

> "Mediating artefacts may thus also open up new moral spaces in their meeting with other people's practiced places. Yet, the outcome of the meaning of material artefacts, like technologies, is not solely determined by the design of the materials but also by the meeting with a meaningful practice."

This was true of the avatar, on an artefactual level, and is related to the process I explore here. However, at the level of subjectivity, the concept is intended as a lens for viewing how such subjectivity "seeps" into objects, rather than becoming entirely merged. If the latter had been the case, "Lukas" would never have been forgotten by the trash cans. Percolation is furthermore a process of filtration - water runs through the percolator, which alters the water while also altering the permeable matter (i.e., coffee grounds), as well as leaving a residue or traces. Whether the human subject is viewed as the coffee grounds or the water is entirely immaterial; the process is what is key, rendering the process reversible. The water and the coffee grounds merge temporarily, in a slow process of filtration, leaving both altered through, by, and with one another, like Lukas and his avatar. If, however, we dilute the coffee that was produced, the process is somewhat reversed, although never entirely. And if we dry the coffee grounds, some of the qualities present before percolation reemerge, though not entirely. Temporality and fluidity are therefore also key aspects of the process of percolation. In Lukas' case, this is exemplified by his negotiations with his mother. Within the conversations, a simultaneous

subjectification of Lukas and objectification of his avatar emerges temporarily, with his mother as an imperfect intermediary. This exchange and negotiation represents a moment of (re)becoming for Lukas; He seemingly negotiates a position with his mother, whilst simultaneously becoming aware of himself as the avatar "… it's me that's inside it". This sentence was not said only as a statement of fact, but also as an expression of insight.

As such, percolated subjectivity might be a specific element or result of mediation (or both). In any case, it is a metaphorical microscope that allows for analysis of that which is mediated—and perhaps also why. The metaphor's relevance, therefore, lies in what it can teach us about social processes of becoming, in this case related to the use of telepresence avatars. If we argue that we solely perceive or relate to technologies as others (alterity relations) or as mediators (hermeneutic relations), we risk overlooking how objects themselves are changed through contact with human subjectivity; they are not just perceived differently, but ontologically transformed, albeit only temporarily. For Lukas, the experience of "being forgotten" was heightened by the entanglement of his subjectivity with the avatar('s) (through the process of percolation), though not as strongly as if he had been there himself. Throughout the rest of the interview, he referred to the experience as "him" being forgotten, rather than the avatar, but (in my interviews) being forgotten is often also connected to the avatars physical materiality, such as not plugging the avatar in to recharge, thus leaving it without power when Lukas needed it, or forgetting to provide Lukas with the correct materials for school assignments, or not giving him notice of a room change. These perspectives on "being forgotten" were further underlined during many of the interviews I conducted, where it was always primarily the absent child who was referred to as being (or at least feeling) forgotten, rather than the telepresence avatar.

This episode might furthermore represent a moment of "interrupted" percolation. The subjectivity that had once flowed into and animated the robot was momentarily not acknowledged within the school setting. The intra-actions that constituted Lukas's presence were momentarily dissolved, and he re-materialized as a forgotten object near a trash can, suddenly "just" plastic and wires.

But the clarity and poignancy of his final line, "It's me that is inside it," reasserted the reality of his entanglement. For those physically and materially present, a white plastic robot had been placed near some trash cans. For Lukas, he still "is" that piece of plastic, even if the outside world did not recognize it as him. Subjectivity, here, is not something the robot carries, like a message; it is emergent, fragile, and relationally sustained - percolated. When that relation falters, so too does the child's capacity to be fully present in the shared social world. It represents a proverbial rug-pull, where agency is suddenly diminished significantly, and Lukas becomes aware of his own powerlessness, something already deeply familiar to any child with a chronic or long-term illness. Such perspectives raise further concerns relating to disability justice and inequality in schooling, particularly regarding how technological mediation risks reproducing existing exclusions under the guise of inclusion. When embodiment and participation depend on others' recognition of the avatar as someone rather than something, the ethics of care, attention, and relational responsibility become central. In this sense, Lukas's experience not only underscores the fragility of mediated subjectivity but also calls for educational practices that acknowledge and sustain the full humanity of remotely present students, ensuring that technological inclusion does not translate into a new form of social invisibility.

Aside from the perspectives outlined above, the way the avatar was referred to as "Lukas" invites us to explore why the avatars, also in all the other cases I have studied, are referred to by the name of the absent child. This is not necessarily contingent on the absent child being logged in (although it plays a role). I have previously discussed how the avatar of another absent student, Julie, seemed to represent Julie's subjectivity; her classmates would refer to the avatar

as Julie, even when there was no connection (Andersen, 2024, p. 16), and even engaged actively with the offline avatar. The notion of percolated subjectivity might analytically be applied to at least better understand what the children in class are engaging with, perhaps as a quasi-subject (Ihde, 2010), but one that finds merit through processes of percolation. To build upon this, we must further explore the phenomena surrounding the apparatus by observing the actions of other subjects as they engage with the avatar and consequently the absent child.

5.3 "THE THING WITH THE EYES MEANS A LOT."

Sometimes, telepresence avatars are also used to mediate users' emotional states, as in the following example, where the young adult user Jimmy explains how he thinks "*(…) it's important that it has those eyes and a mouth, so you can somehow symbolize how you're feeling.*" He elaborates, explaining how he makes use of the different "facial" animations offered by the AV1 telepresence robot:

> [Jimmy]: So, I think it's important, because the thing with the eyes means a lot. If my eyes [the avatar's LEDs] are, like, just that happy look, or that you're in a ready mood [ready to participate], the teacher and, well, the other classmates might go, "Oh, yeah, that means something." It actually means, "He's on the robot, and he wants to participate." I mean, instead of just being "him" directly, it's like "he wants to be an active part of the class with group work," and the teacher can ask me questions, just like they do with everyone else in the class.

In this example, the avatar imitates stereotypical human emotional cues rather than cues specific to a particular human subject. Examples can be seen in the pictures of an identical avatar to the one used by Jimmy:

Figure 2: Examples of emotional depictions by the AV1 telepresence avatar, with the intended interpretations (researchers pictures)

The avatar intra-acts with and through emotional impressions and what we might call human residues. As such, what percolates through the avatar here are anthropomorphic, emotional qualities. However, these qualities manifest in ephemeral ways, reminiscent of emotional expressions by humans, but never quite as intense. Instead, the avatar often offers a novel, perhaps even quirky intra-action with emotional phenomena. The technology thus became a percolation apparatus through which Jimmy was able to extend his own subjectivity ("If 'my' eyes are (…)"), but in turn is viewed in subjectively different ways, through the intra-actions with other subjects and the apparatus. As mentioned, percolation always alters all substances or materials in the intra-action, transforming both the water and the coffee grounds. Jimmy's

experiences specifically exemplify this reciprocity of percolation, as human emotionality enters the apparatus through which subjectivity percolates.

Jimmy further explained the different material meanings related to the selection of digital appearance:

> And then there are, like, the other eyes, where you're kind of more... There's the one where you can be asked questions. Important questions, but you're more... you're more just listening.
>
> [Interviewer]: Ah, OK, so it's a bit like if you were sitting in class, you'd maybe be more closed off in your body language or...
>
> (…)
>
> [Jimmy]: Yeah, exactly, and that's also what I mean. There are sort of three levels: you're just listening, and you don't want to be disturbed, so you're just there to... hear what's going on, but you don't really want anything social or a conversation. Which I think makes sense, because if I'm ill or feeling unwell, I still want to listen to the teacher's lecture, but I wouldn't have the energy or capacity to sit and do tasks or be involved in conversations.

Here, subjectivity is not only "transferred" to the avatar (robot to Jimmy), it saturates and tinges it, producing specific affective and communicative cues that only specific others can read. The robot is not just a proxy for Jimmy, but an interface through which his internal state is externalized, made legible to the class. This legibility is crucial: Jimmy's avatar becomes a medium through which his agency and subject position can fluctuate. What Jimmy engages with here relates to certain agreements with classmates and teachers. Such agreements, Jimmy told me, emerged through continuous intra-actions in the social context—for Jimmy, a remote context. Thus, the emotional cues and "raised hand" signals that the AV1 avatar can express are given a further layer of interpretation as they entangle with silent agreements between Jimmy and his specific, remote school setting. With the "happy eyes," Jimmy signals his readiness to engage with questions, for recognition as a subject among peers. With the more "closed" look, he expresses his desire to remain part of the learning environment, but with a boundary, closing himself off from interaction. These expressions of "moods" by the robot are not just signals; they are material-discursive enactments of subjectivity, coded into the robot's facial expressions, but within the specific apparatus of Jimmy and his class. Jimmy's subjectivity percolates, changes the affordances of the robot, and these changes ripple outwards, shaping how others relate to him and entangle with processes of engagement. Such agreements relate to what the technological cues might also mean, which goes beyond the developers' intentions, and furthermore, it is specific to Jimmy's case. This adds to the percolated subjectivity and exemplifies a difference between Jimmy and the avatar, while underlining the reciprocal relationship in the entanglement of the subjectivities of both Jimmy and the avatar. Such agreements are furthermore present in much of my empirical material, underlining a tendency to both technologically and socially "tinker" with the use of telepresence avatars. This is a perspective for future research, empirically inviting us to view cyborgian connections as undergoing continuous adaptation based on needs in situ, which is something both inherent to and a consequence of processes of percolated subjectivity.

6 CONCLUDING REMARKS

To summarize, percolated subjectivity involves both the subjective entanglements of human subjects and the imagined, perceived, or experienced subjectivity of telepresence avatars. Subjectivity thus moves across living and non-living bodies, making lived (and momentarily

"living"), cyborgian bodies out of plastic, lights, and wires. It is more about the process of percolation, the filtering of qualities, than about the consequences of such processes. However, the consequences of subjectivity undergoing a process of percolation are interesting with regard to absentee students. Does this process entail that the absent student's classmates engage with a subjectivity that they do not experience as the absent student, or at least not entirely? Given that the goal of most efforts to mitigate school absence is that the absent student will one day again be present, it is important to address these consequences in any didactic or social preparation for and engagement with telepresence.

Ultimately, the aim is that percolated subjectivity, together with other sociological, philosophical, and psychological concepts such as mediation, multistability, intra-action, etc., will enable a better understanding of absent students' engagement with(in) schools. Such concepts allow social science researchers to acknowledge the complex and heterogeneous ways in which technology affects human relationships, while still also acknowledging the imaginaries experienced by humans. This is especially important when such imaginaries become co-constituent, agential elements in the apparatus of entangled phenomena where humans engage with other humans and technologies. It comes to matter when humans inadvertently or deliberately alter, shape, and tinker with technology. In a practical sense, it enables an understanding of what might be needed or prudent when practitioners engage with technology; For instance, technologies that support children who have experienced loss. Such technology might not always be a physical avatar, but could potentially also be SoME profiles (Jiang & Brubaker, 2018). Through such perspectives, the concept might also influence implementation and didactical perspectives on applications (i.e., Turner et al., 2024; Weibel, Bergdahl et al., 2023) where technology mimics human emotions or characteristics. We might better grasp processes of othering through technology if we better understand what is sifted, filtered, or percolated (and what is not) in cases where students experience being *forgotten* in class, for example.

The notion of a percolation apparatus might also be an analytically prudent concept for future analysis of such subjective processes of becoming, perhaps related to what telepresence avatars look like and how we engage with them. As such, tinkering as a concept—implying that we engage with technology unceremoniously, altering it for human benefit or efficiency (Turkle et al., 2006)—has previously been mentioned as relevant in relation to avatar implementation (Turner et al., 2022). Percolation and tinkering might thus improve our engagement with how we better enable presence for absentee children and young people, if we are looking for solutions based on technologically mediated practices. However, it is a topic that requires further study.

Lastly, the concept should enable greater analytical insight into processes of becoming through a view of the reciprocal relationships that occur when humans and technologies entangle, merge, and re-emerge as bodies. In all the empirical examples presented in this article, the child and the telepresence avatar together form a cyborgian assemblage where the distinction between the organic (the child) and the synthetic (the avatar) is operatively irrelevant. The child's agency, perception, and social presence extend into and through the avatar. The child's presence through the avatar is not merely "child+machine," but a cyborgian mode of existence where the boundaries between self and technology are functionally dissolved. The concept of percolated subjectivity is potentially relevant in any context where human subjectivity extends into non-human objects. It could also be applied to gaming culture, where a key example might include the sorrow felt when saying goodbye to a virtual avatar that you have spent years with (Chimirri et al., 2018). Smartphones as percolation apparatuses represent another potentially relevant context, as does future engagement with artificial intelligence, such as when students write essays through and with AI (Stokel-Walker, 2022), or when humans "date" AI chatbots, or simply ask AI to write their online dating profile. Thus, the concept is applicable from both

human–technology perspectives and human–technology–human perspectives and is particularly poignant when applied to boundary-blurring contexts associated with cyborg relations.

Data Access Statement

The participants of this study did not give written consent for their data to be shared publicly, in a non-pseudonymized manner, so due to the sensitive nature of the research, supporting data is not available. Some of the anecdotal material was related to a previous study wherein the author participated, which is referenced as external, when relevant.

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There is no conflict of interest.

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